May 2010

Consumer Robotics: State of the Industry and Public Opinion

Brian K. Silvia
Worcester Polytechnic Institute

David Paul Bernstein
Worcester Polytechnic Institute

Remy George Michaud
Worcester Polytechnic Institute

Project Number: TP1 IQP SOTA

Consumer Robotics: State of the Industry and Public Opinion

An Interactive Qualifying Project Report

Submitted to the Faculty

of the

WORCESTER POLYTECHNIC INSTITUTE

In partial fulfillment of the requirements for the

Degree of Bachelor of Science

by

David Bernstein
Robotics Engineering
Class of 2011

Remy Michaud
Electrical Engineering
Class of 2011

Brian Silvia
Robotics Engineering
Class of 2011

Date: May 5, 2010

Professor Taskin Padir, Project Advisor

1. Robotics
2. Consumer
3. Robots

Table of Contents

Table of Figures

I - Introduction

The Robotics Primer[1] defines a robot as "an autonomous system which exists in the physical world, can sense its environment and can act on it to achieve some goals." As robotic technology continues to advance and accelerate, it is likely that human interaction with robots will become more of an everyday occurrence. These improvements will include better processing power, longer battery life, and many others. All of these developments improve robots abilities to achieve their goals as well as making it possible for newer robots that can achieve feats that are not currently possible. Much of this interaction will be the result of increased use of robots by average consumers in their homes. This project concentrated on investigating the use, prevalence and demand of robotics in households, and defines these robots as consumer robots, as they are used by an end user who is a private citizen to accomplish household duties.

Examples of consumer robots already in home use include robots that perform household duties, such as the iRobot Roomba, The Husquvarna Automower, and the DrIron by Fagor[2,3,4]. This general category of robots that perform household chores exists due to humans not wishing to or having time to perform tasks that are dirty, dull or repetitive. Examples of such chores include vacuuming, washing floors, laundry, and many others.

Preliminary research indicates that this market area has been experiencing tremendous growth as evidenced by statistics for iRobot's revenue. iRobot's sales climbed from $14.8 million in 2002 to $307.6 million in 2008 of which 56%, or $173.5 million, came from the home robot market[2]. Given the average selling price of $150 per unit, that equates to 1.1 million household units sold in 2008 by a single robot manufacturer. How can we be sure that the direction of consumer robotics will coincide with the needs and wishes of the general public? This project hopes to provide the information necessary to achieve the needs and wishes of the public. As the application areas of consumer robots

grow, it becomes critical that the development of future consumer robots anticipates the expectations of the end user.

Objective

There are two main objectives for this project. The first objective is to quantitatively evaluate the prevalence of consumer robotics in North American households, as well as exploring the current demand for consumer robots. This project will also explore future research and development areas from the consumers' point of view.

The second objective is to determine the government plans that are in place to advance consumer robotics or consumer usage of robots. These findings are covered in the Background chapter of this report. The project will also provide an overview of the efforts being undertaken in North America, Europe and Asia as a comparative study. For example, the governments of South Korea[5] and Japan[21] both have well documented and aggressive plans in place for domination of the world consumer robotics market. The government of South Korea has stated that it aspires to holding the top position in world robotic production by 2018 and having a robot in every South Korean household by 2020.

By attaining the public's opinion on consumer robotics and determining how governments plan to further consumer robotic development, this project seeks to determine the current state of consumer robotics and provide a projection for future research and development.

Background

Defining the Robot

This project uses the definition of a robot as defined by *The Robotic Primer*: "A robot is an autonomous system which exists in the physical world, can sense its environment and can act on it to achieve some goals[1]." Since the scope of this project is limited to consumer robots, the authors of this study defined them as "robots available to the public and designed to be used in a household

environment." This definition implies that some devices commonly considered as robots including non-autonomous, remote controlled devices and certain software programs are outside the scope of this project.

North American Robotics Programs and Consumer Robotics Companies

The United States lacks any form of government directed consumer robotics programs but instead invests in education and research into advanced technologies.[8,9] The primary reason for this research is for the Department of Defense.

In the United States there are two financially prominent organizations that exist to fund research and advanced technology, including robotics. The first is The National Science Foundation (NSF). Their objective is both education and research into any subject relating to science or technology. In the fiscal year of 2009 The National Science Foundation received over six billion dollars. This money is used to fund over 11,000 new projects and research programs per year but also to maintain funding for previous years endeavors. They also supply a large number of grants to independent research programs and supply educational material for different scientific subjects. This funding does not directly affect consumer robotics but does in the long run spur interest in the field as well as develop technologies that will later be implemented in the commercial market.[8]

The second organization that provides funding is primarily the Defense Advanced Research Projects Agency (DARPA) ,a branch of the Department of Defense, which is responsible for many of the major technological advancements such as the Internet. None of their programs are tailored for the consumer market but competitions and research projects like the automated vehicle challenge[33] may at some point be adapted in the future for use in the public. The automated vehicle challenge is known officially as the DARPA Grand Challenge and consists of many teams running fully autonomous vehicles through a difficult course in order to help the development of autonomous robots. There are cash

rewards to encourage entries into the contest. More information about this competition can be found on the DARPA website.[9]

There are number of consumer robotics companies that operate in the United States. The most well known producer of consumer robotics in the United States is iRobot, based in Bedford, Massachusetts.

iRobot has seen significant growth in the past few years as they have created and improved many different consumer robots. The robot that they are best known for is the Roomba Robotic Vacuum. The current generation of Roomba costs 339.99 dollars. iRobot also has other less known robots such as the Scooba the hard surface floor cleaning robot, Verro the pool cleaning robot, and Looj which is a robot specifically designed to clean gutters. But the best seller is the Roomba, selling over a million units by 2004 and far past that number now.[2] and They have seen an increase in revenue from 14.8 million in 2002 to 298 million dollars in 2009.[2] Their business model follows the method of creating adaptable platforms to achieve different goals. This reduces design costs and allows them to have many different Robots in the market place. They are not solely a consumer based company though; they also produce military robots for the Department of Defense (DOD) with the military as an end user. iRobot also has programs in place to help educate elementary and high school students about robotics in an attempt to spur interest in the subject.[2]

Figure 1 - iRobot Roomba

http://media.obsessable.com/media/2008/10/21/300/irobot-roomba-1.jpg

Another company, Evolution Robotics[10], produces a telepresence robot. A telepresence robot is a robot that has speakers, microphone, and a web cam in order to allow someone to control and communicate with people from a long distance and be able to move said robot around. While these robots have yet to gain a significant foothold in the United States, there are many other companies that also produce telepresence robots under different names and designs, such as the QA form AnyBots[34]. They recently have discontinued their main telepresence robots in favor of more general purpose platforms, and selling hardware to other companies and individuals.

Figure 2 - Evolution Robotics ER1

http://www.evolution.com/images/er1_robot/r_home_bot_right

A recent study was also conducted that determined older adults want robots to do more around their homes which suggest that companies may be falling behind in the demand that currently exists. The only well known household robot in the United States is the Roomba which was first introduced in September 2002.[2] The companies need to start creating more robots with every day uses and they need to start advertising them to a greater number of people.[11]

Another company, Willow Garage is working to create the next generation of consumer and personal robots in North America. Willow Garage, located in Menlo Park, California, is a research and development company concentrating on personal robots. The most important development so far is the PR2 platform (Figure 3). This platform has two arms, can move itself, has multiple sensors such as

stereo cameras, a range finder, a 5 megapixel camera and a LED projector in its head. For a full list of sensors and features please visit the PR2 overview on Willow Garage's website.[12] The versatility of this system allows it to be programmed to achieve many different goals. There are currently videos on the Willow Garage website showing the PR2 folding and sorting laundry which is an extremely advanced task for a general platform to be able to accomplish. The PR2 will pave the way for increased ability of robots and more effective robots that can accomplish many different tasks.

Figure 3 - Willow Garage PR2

http://www.willowgarage.com/sites/default/files/robots_pr2/Beta_1-5.320w.jpg

European Consumer Robotics

While European robotics companies develop diverse products and platforms, the scope of this project narrows the view to household consumer robots. This section aims to showcase European designed and manufactured robots that mow lawns, vacuum floors and iron clothes.

Figure 4 - Husqvarna Automower

http://www.husqvarna.com/c/i/prd/h/automower-230-acx-h310-0316-5b116d8b.jpg

One example of a European made lawnmowing robot is the Automower from Husqvarna, based in Sweden. This is a line of robots that vary in size and price depending on what your lawn size requirements are. The Automower takes care of mowing the lawn at intervals it determines to keep the grass short and when it is done mowing, it return to its charging hut so it requires very little human interaction. The Automower has been on sale since 1995 and in 2009 just reached its 100,000th sale and is now available in 30 countries worldwide[3]. Another example of lawn care robot it the Ambrogio by Zucchetti Robotica, located in Italy. Ambrogios are available in multiple sizes, much like the Automower, to fit your lawn size requirement[13].

Similar to iRobot's Roomba, there are robotic vacuums available from European companies that are typically known for their products other than robots. Electrolux, a Swedish company known for manufacturing household appliances, introduced their version of a vacuum robot, the Trilobite in 2001. At $1500, the Trilobite was considerably more expensive than the Roomba, but included ultrasonic sensors to avoid objects, instead of merely bumping into them, as well as programming that allowed it to determine the size of the room as it cleaned the edges, then establish a method to most efficiently

clean the room. Unfortunately, high cost led to poor sales and eventually the discontinuation of the Trilobite[14].

Figure 5 - Electrolux Trilobite

http://www.appliancist.com/robotic-vacuum-cleaner-electrolux-trilobite.jpg

The German company Karcher, best known for their power washing equipment, also has a robotic vacuum, the RC3000. Also available for $1500, the RC3000 is similar in operation and sensor systems to the Trilobite, however when it returns to its docking station to charge, its dust bin is emptied into a bag located in the charging base and its brushes are cleaned[15]. This means that the RC3000 can go about a year without interaction from a human, making it more user friendly than both the Roomba and the Trilobite.

Figure 6 - Karcher RC3000

http://www.roboticvacuumcleaners.co.uk/robotic-vacuum-reviews/images/karcher-rc3000/karcher-rc3000-robot-cleaner.jpg

One home chore that has not had much worldwide robotic development is ironing clothes. One robot that did try to ease this chore was the Siemens Dressman[16]. The Dressman is shaped like a human torso with arms, seen in Figure 7 below. Any shirt or jacket can be stretched over it and the torso inflates to the right size using sensors and determines how much heat and hot air are required to remove any wrinkles. The Dressman debuted in 2004 and was available globally for $1400. Its high price and limited use (only shirts and jackets) led it to be discontinued after only two years of sale, despite selling over 4000 units. Another robot that removes wrinkles from clothes is the DrIron from the Spanish appliance manufacturer, Fagor. DrIron dried clothes and removed wrinkles using multiple sensors in its internal compartment to determine how to properly dry and iron different fabrics. It first became available in 2005, but its high price and limited availability led it to also be discontinued[4].

Figure 7 - Siemens Dressman

http://www.uberreview.com/uploaded_images/dressman-795990.jpg

Robosoft, a robotic research firm located in France, has been developing multiple platforms for security, transport and elderly care robots. Their RobuRIDE platform is currently being tested in Rome and is intended for autonomously transporting tourists between historic sites.

Figure 8 - Robosoft RobuRIDE

http://www.robosoft.com/img/data/phototheque/format_350x243/1018!200207131918355_jpg3963.jpg

Robosoft is also developing a platform they call the RobuLAB10. This platform is intended to be used as an assistance robot for the elderly, helping them with standing/sitting, and helping them maneuver around their residence, eventually learning frequently used locations so the user simply as to say where they want to go and the RobuLAB10 will help guide them there safely[17].

Asian Robotics Programs and Consumer Robotics Companies

Three countries, China, Japan and South Korea lead the research and development in consumer robotics in Asia. The amount of accessible information from those three nations is due to them leading the production of robotics in Asia. China, Japan and South Korea were selected to act as representatives for the current state of consumer robotics in Asia.

Due to the availability of their information, China, Japan and South Korea were selected to act as the representatives for the current state of consumer robotics in Asia.

The majority of information discovered about Chinese robotics research came from the Chinese university of Hong Kong (CUHK) [18]. At this university, they have over a dozen robotic development projects in progress. Three robots in particular seem the most significant. The 'Gyrover' is an extremely advanced robot in that it drives on a single wheel, using gyroscopes to remain upright. In addition to

this, it is also amphibious. The designers have a multitude of uses for this robot including; surveillance, transportation, rescue, mine detection, and leisure[18].

Figure 9 - Gyrover: A multi-purpose robot

http://arl.acae.cuhk.edu.hk/files/singlewheel.jpg

On the consumer side the most significant robots developed by CUHK are 'Petsitter' and the 'Smart Wheelchair'. 'Petsitter', as the name suggests is a robot designed to care for a pet when the owner is unavailable to do so. It allows the owner to remotely play with, feed, and monitor their pet via the internet[19].

The 'Smart Wheelchair' is an electric wheelchair that uses several sensors and programming algorithms to make navigation easier to handicapped people. The robot is able to map frequented locations in order to help the person maneuver around obstacles such as chairs and tables. Additionally, it uses sensors to prevent the wheelchair from colliding with obstructions[20].

Figure 10 - Petsitter: A robotic caretaker

http://arl.mae.cuhk.edu.hk/files/petsitter-1.jpg

Figure 11 - Smart Wheelchair: A semi-autonomous wheelchair

http://arl.mae.cuhk.edu.hk/files/wheel-2.gif

Preliminary research on Japanese robots resulted in four primary focuses. The most scientifically significant topic discovered was the Japan Space Exploration Agency's (JAXA) intention to use robots to explore the solar system[21]. They hope that using robots to explore the moon and other planets will help to increase the economic gain for Japanese citizens. They also intend to use this program as a means of expanding Japan's space program. While not directly related to consumer robotics, the government research for developing new space robots will yield overlapping technology which can be used to improve consumer robotics.

HRP-4C is a robot being developed in Japan to act as fashion models[22,23]. They are modeled after the average Japanese woman. Their initial use will be to model designed cloths by displaying them on runways, but due to the robots capability for voice recognition and speech synthesis would allow the robot to be adapted to jobs similar to tour guides or other similar tasks.

Figure 12 - HRP-4C: A robotic fashion model

http://www.blogcdn.com/www.engadget.com/media/2009/03/hrp-4c-fashion-robot.jpg

Saya is another humanoid robot being developed in Japan [24]. Saya is intended to act as an educational robot. Eventually it is hoped that it will be capable of teaching all levels of education, but as of now it is only instructing primary school students. It is capable of exhibiting several emotions and speaking multiple languages. For Japanese consumer robotics, no specific robots seemed prevalent, but Japan's plan for the field seems promising. Japan has a goal of putting a robot into every Japanese household by 2015. In order to help accomplish this goal, the Japanese government has invested thirty five million dollars to stimulate growth[25].

Figure 13 - Saya: A teaching robot

http://assets.nydailynews.com/img/2009/03/12/amd_robot_teacher_mad.jpg

In South Korea, the publicized government spending plan make the development of robotics seem to be taken more seriously than in China or Japan. The government has big intentions for robotics. They want to be one of the top three robotics manufacturers by 2013, the top manufacturer by 2018,

and have a robot in every South Korean household by 2020. Their economic goals include profiting $1 billion per year due to exports and $3 billion dollars per year due to domestic consumption. In order to meet these goals, the South Korean government has pledged $750 million dollars and the Economic Ministry has already invested two hundred and sixty four million dollars[5]. Current robotics projects that are being pursued are Hoya, EveR-1, and iRobi. Hoya is a fire fighting robot. It is equipped with multiple sensors to obtain images, sounds temperatures, and information about gas and smoke in burning buildings[26].

Figure 14 - Hoya: A firefighting robot

http://i.i.com.com/cnwk.1d/i/bto/20091007/Hoya4.jpg

EveR-1 is a humanoid robot that is intended to take over a variety of tasks currently performed by humans. Tasks include teaching, giving tours, and greeting customers or clients. It is expected to maintain eye contact, carry on conversations and express emotions in order to be more accepted by the people it interacts with[27].

Figure 15 - EveR-1: A multi-use humanoid robot

http://news.nationalgeographic.com/news/2006/05/images/android-korea-1_big.jpg

iRobi is intended to be a consumer friendly nanny robot. It is being designed to autonomously care for children. It will be able to educate, play with and sing with children while allowing parents the ability to remotely monitor their children[28].

Figure 16 - iRobi: A babysitting robot

http://www.ubergizmo.com/photos/2009/10/irobi.jpg

Evolution of Research

The Interactive Qualifying Project (IQP), State of the Art in Robotics (SotA) began as an assessment of the current usage, research and investment in robotics. The globe was divided into three

regions; North America, Europe and Asia. The intent was to look into a variety of robotics categories including military, medical, industrial, space exploration, educational and consumer robots. For each area of the globe, research was conducted to find information about each branch of robotics. As research was conducted, it became clear that there would be insufficient data to draw conclusions about the original goal. Different regions of the globe only had information available about certain branches of robotics, with no research available on the other branches. This trend was prevalent in all of the areas of the globe. It could have been hypothesized that those areas were only concentrating on the topics where research could be found, but it seemed very unlikely that any area of the globe would completely forgo a type of robotics. It was decided that information about the different types of research simply was not available, either by not being published in English or by restricting the information to whoever was conducting the research.

The only exception to this trend was consumer robotics. Unlike the other branches of robotics, companies working on consumer products have an incentive to make their research and products public. The more people who know about a product, the more people will buy it. It was determined that this philosophy leads companies developing consumer robotics to publish more information about their robots and also to publish the information in more languages as a means of reaching a larger clientele base.

After determining that consumer robotics was globally published, it was decided that SotA should focus on consumer robotics. Research was focused on finding information pertaining specifically to consumer robotics. Information was found about budgets spent on developing new robots, types of robots in production and in development, different companies developing robots and company goals for their plans for consumer robotics in the future. Of all the research discovered on consumer robotics, the only thing not determined was the public stand on robotics in their households. Consumer acceptance

and the amount of money they would be willing to invest in a robot remained to be the information that wasn't readily available.

It was determined that, since there was no prevalent information on how the consumers feel about robots, SotA would focus on discovering how the public opinion felt about robotics. In order to discover this information, a survey was created so that raw information could be assembled and analyzed. Due to language constraints as well as limited capabilities on contacting the public in foreign countries, it was decided that the survey, and therefore the project SotA, would focus on the U.S. consumers.

While finding research for this IQP, a similar IQP was found, *The Social Implications of Household Robotics*(SIHR). When this IQP was found, it became important to ensure that SOTA focused on different aspects than SIHR. SIHR concluded that the market for consumer robotics is limited. It also determined that the robots' "role in our society will slowly yet inevitably grow." The IQP states that as people identify more household tasks, the market for household robotics will increase. SOTA builds on SIHR by establishing how the current and future states of robotics look. SOTA also gives recommendations to robotic manufacturers. The recommendations are intended to allow manufacturers to expand their consumer base and public acceptance of robots.

II - Methodology

There are two main phases to this Interactive Qualifying Project (IQP). The first phase is aimed at gathering the opinion of consumers in the United States about consumer robotics. This has been accomplished by creating and distributing the main survey as well as a secondary, minor survey. The second phase of this IQP concludes the project with a statistical analysis of the data collected. The objective is to establish a concise understanding of the current state of consumer robotics in the United States as well as determine how closely the current research and development being done in the consumer robotics sector matches up with the needs and expectations of the general public.

This Interactive Qualifying Project (IQP) was deployed over the course of B, C and D term of 2009-2010 Academic Year, spanning October 27th 2009 to May 4th 2010.

Table 1 – Methodology Outline

Phase I: Design, Development and Distribution
Review background research
Design primary survey
Distribute primary survey through multiple online resources.
Design secondary minor survey
Distribute minor survey at FIRST Regional Competition at WPI
Phase II: Analysis and Recommendations
Compilation and analysis of results from primary survey
Compilation of results from secondary minor survey
Comparison of results from the two surveys
Recommendations developed for advancement of the consumer robotics industry

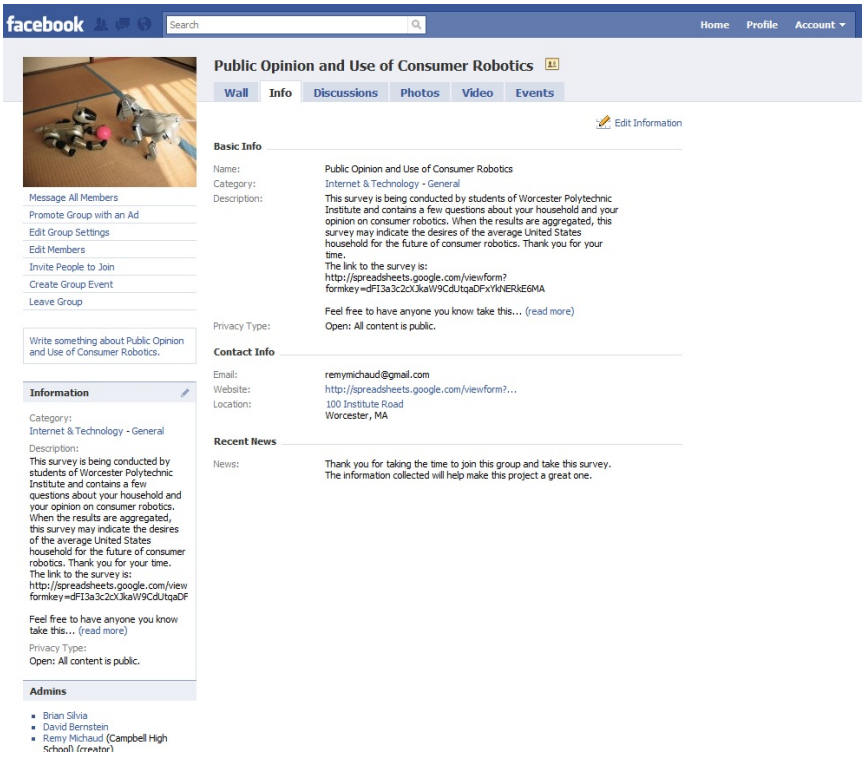
Summary of Methodology

In Phase I of the IQP, efforts are focused on the development and distribution of a survey whose objectives are to determine the prevalence of robots in American households and to gauge what the American public is looking for in terms of functionality and price of household robots.

1- The first selection made in designing the survey is who would be included in the sample. The first group to be sampled is the Worcester Polytechnic Institute community. This group is chosen for the ease with which a survey can be distributed and the demographic, which is mostly 17 to 21 year olds but also includes professors and other faculty members, giving a good cross section of the American public. The survey is also distributed to family of the group's members. This allows the survey to be circulated among an older demographic than the WPI community and included people of varying education levels, incomes and ethnic backgrounds. Finally, it is decided to create a Facebook.com group page for our survey.

Figure 17- Facebook.com Group for Survey Distribution

http://www.facebook.com/#!/group.php?gid=314847060046



Facebook.com groups are a powerful tool to reach many people in a very short period of time. While the demographics for Facebook.com users are primarily teens, Facebook.com is becoming increasingly popular with older age groups.[35]

Table 2 – Survey Questions

Background Information
What is your gender?
Select appropriate age group.
What is your average yearly household income (in USD)?
Are you currently attending school?
What is your highest level of completed education
What is your occupational area?
In what type of residence do you currently reside?
Questions on Consumer Robotics
How many robots does your household own?
What are the primary functions of the household owns (if any)?
How much would you be willing to pay for the following types of robots?
Vacuuming/Floor Cleaning Robot
Lawn Care
Cooking Robot
Robotic Pet
Educational/Tutor Robot
Personal/Elder Care Robot
Optional Questions
What would you like to see household robots be able to do?

2- The next step in designing the survey involved choosing what questions we wanted answered and in what order they should be presented. The survey, as it was presented to the subjects, can be seen in Appendix F. Table 2 provides a summary of the survey questions. First part of the survey is aimed at gathering background information about the subjects being surveyed. This information would allow sorting of the results to see if trends might exist. These questions were placed at the beginning of the survey to allow the respondents to quickly fill out the majority of the survey's bulk. These questions were also made optional in case subjects did not wish to give out any personal information. Background information we wanted to gather from our subjects included gender, age

group, average yearly household income, current student status, highest completed level of education, occupational area and type of residence in which they currently reside.

The second part of the survey is devoted to questions to assess the public's opinion of consumer robotics. One critical piece of information we wanted to gather was the number of robots were owned by each household surveyed and if any, what those robot's primary functions were. To aid in answering this question, a short definition of a robot within the scope of our project was included at the top of the survey. Through our research done early in the project, we determined six major types of consumer robot either currently available on the market or deep into development. To evaluate market desire for these types of robots, respondents were asked how much they are willing to pay for each type of robot and were given six price ranges in one hundred dollar increments ranging from "under $99" to "$500 and up". The last question added to the survey is an optional open ended question asking what the subject would like to see household robots be able to do in the future. This question was added to assess whether what research is being to develop household robotics corresponds to what the American public would like to see in the coming years.

3- The survey was created using the spreadsheet tool in Google Documents. This allowed for free hosting of the survey and easy editing of questions. To "debug" our survey before it was made public, it was sent to several friends and family members of this IQP group. Based on their feedback, certain response options were added to some of the questions as well as making the majority of questions have drop down box responses to lower the overall visual length of the survey. A timeline of survey events can be seen in Table 3.

Table 3 –Survey Timeline

2/15/2010	Primary survey first released to the public
2/18/2010	Hyperlink to primary survey sent out to WPI community Facebook.com group for survey created
3/11-3/13/2010	Secondary survey distributed at the WPI FIRST Regional Robotics Competition
3/19/2010	Primary survey closed for additional responses

The survey was released for public responses starting on February 15th, 2010. Links initially were sent out to various family members and then distributed from there to other acquaintances. On February 18th, 2010, a hyperlink to the survey was sent to the Worcester Polytechnic Institute students and faculty. A Facebook.com group was also created on February 18th including a link to the survey and asking any members to please fill out the survey. The survey was closed for responses on March 19th, 2010. As the survey was not sent to a specific group, a response rate cannot be calculated. For more information on the responses received, please see the Results section of this paper.

A second, short survey was created and distributed shortly after the primary survey. The second survey was done verbally at the F.I.R.S.T. Robotics WPI Regional Competition at WPI in Worcester, Massachusetts from March 11th to 13th, 2010. A copy of the questions from this survey can be seen in Appendix G. This survey was taken to see if the results would differ from our primary survey. We hypothesized that we might receive different results due to competitors and attendees at F.I.R.S.T. Robotics competitions likely being more accepting of household robots, and therefore more likely to own personal robots.

In Phase II of the IQP, the analysis phase, the results from our survey are used to look at the prevalence of robots in American households as well as the desires of the American public for the

future of household robots. This analysis is be compared to the direction of current robotics companies to determine if the wants of the public match op with current and future consumer robots.

III - Results

This chapter presents the results of the research completed within the scope of this project. These results are split up by the two surveys performed. A full list of all the responses from the primary survey can be found in Appendix C. Free response answers listed are only the more prominent answers, an unabridged version of the free responses are presented in Appendix D**.** Table 4 provides a tabulated summary of the survey results before they are presented in detail here.

The results were largely of the age group of 17-25. The household incomes were polarized with the majorities either having an income of less than 10,000 or more than 120,000 dollars. Most responses are currently attending school. Most live in either homes or apartments with nearly none living in condominiums. The prevalence of robots in households is very low with 81% of people surveyed had no robots in their homes. The people who did have robots in their homes primarily had robots which cleaned and vacuumed. Of the types of robots polled, the most popular robots were cooking robots and elder care robots. It was surprising to find that the results of the small survey given at the FIRST regional at WPI mirrored the results of the larger survey with its lack of prevalence. The following shows the tabulated version of the results. For a full discussion of the results continue reading after the table.

Table 4 – Summary of Primary Survey Results

Gender	#	%
Male	207	54%
Female	173	46%
Age Group		
Don't wish to respond	5	1%
17-25	240	63%
26-35	25	7%
36-45	30	8%
46-55	45	12%
56-65	30	8%
66+	5	1%
Household Income		
Don't wish to respond	129	34%
Less than $10,000	67	18%
$10,000 - $29,999	17	4%
$30,000 - $49,999	24	6%
$50,000 - $79,999	39	10%
$80,000 - $119,999	42	11%
$120,000 +	62	16%
Currently Attending School		
Yes	237	62%
No	143	38%
Highest Level of Education		
Don't wish to respond	14	4%
No Formal Education	1	0%
Middle School	3	1%
High School	213	56%
Associate's	27	7%
Bachelor's	62	16%
Master's	36	9%
Doctorate	24	6%

Vacuuming/Floor Cleaning Robot	#	%
Up to $99	234	62%
$100 to $199	105	28%
$200 to $299	29	8%
$300 to $399	9	2%
$400 to $499	2	1%
$500 and up	1	0%
Lawn Care		
Up to $99	178	47%
$100 to $199	67	18%
$200 to $299	53	14%
$300 to $399	39	10%
$400 to $499	17	4%
$500 and up	26	7%
Cooking Robot		
Up to $99	216	57%
$100 to $199	69	18%
$200 to $299	39	10%
$300 to $399	27	7%
$400 to $499	8	2%
$500 and up	21	6%
Robotic Pet		
Up to $99	343	90%
$100 to $199	19	5%
$200 to $299	11	3%
$300 to $399	1	0%
$400 to $499	0	0%
$500 and up	6	2%
Educational/Tutor Robot		
Up to $99	241	63%
$100 to $199	66	17%
$200 to $299	33	9%
$300 to $399	19	5%
$400 to $499	9	2%
$500 and up	12	3%

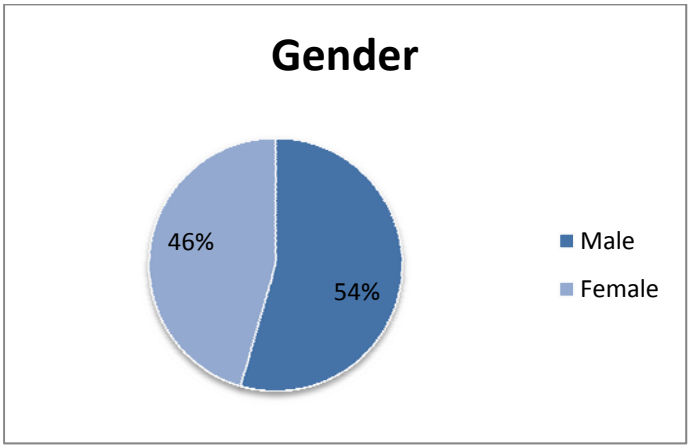
Number of Robots in Household	#	%
0	306	81%
1	48	13%
2	13	3%
3	3	1%
4	1	0%
5	5	1%
6	0	0%
7	0	0%
8	0	0%
9	0	0%
10+	4	1%
Primary Functions of Robots Owned		
Cleaning	51	52%
Entertainment	28	29%
Lawn Care	2	2%
Security	5	5%
Other	12	12%

Personal/Elder Care Robot	#	%
Up to $99	157	41%
$100 to $199	28	7%
$200 to $299	41	11%
$300 to $399	31	8%
$400 to $499	27	7%
$500 and up	96	25%

Primary Survey Results

There were a total of 380 responses to the on–line survey though all methods used for distribution. There were a total of 173 female responses and 207 male responses. The surveying methods used managed to keep the amount of gender bias to a minimum. The age group surveyed was predominantly 17-25 with a total of 240 responses. Five chose not to respond to their age. The 26-35 bracket contained 25 people. The 36-45 bracket contained 30 people. The 46-55 bracket contained 45 people. The 56-65 bracket contained 30 people and the 66 plus category only had 5 people.

Figure 18 - Primary Survey Gender Responses



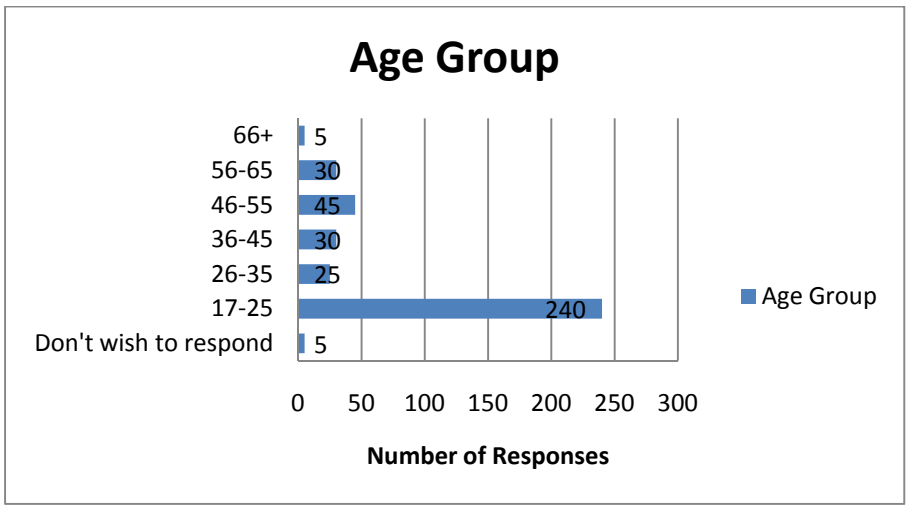


Figure 19 - Primary Survey Age Responses

There were 129 responses that chose not to answer the question of their household. The majority of those who did supply their house hold income was either in the 10,000 dollars or less or the over 120,000 dollar ranges. Sixty-seven responses reported their annual household income under 10,000 dollars. The next bracket of 10,000 to 29,999 dollars consisted of 17 people. Twenty-four people responded with an income between 30,000 and 49,000 dollars. Thirty nine people responded with an income between 50,000 and 79,000 dollars. Forty-two people responded with an annual income between 80,000 and 119,000 dollars. Finally 62 people responded with an income higher than 120,000 dollars.

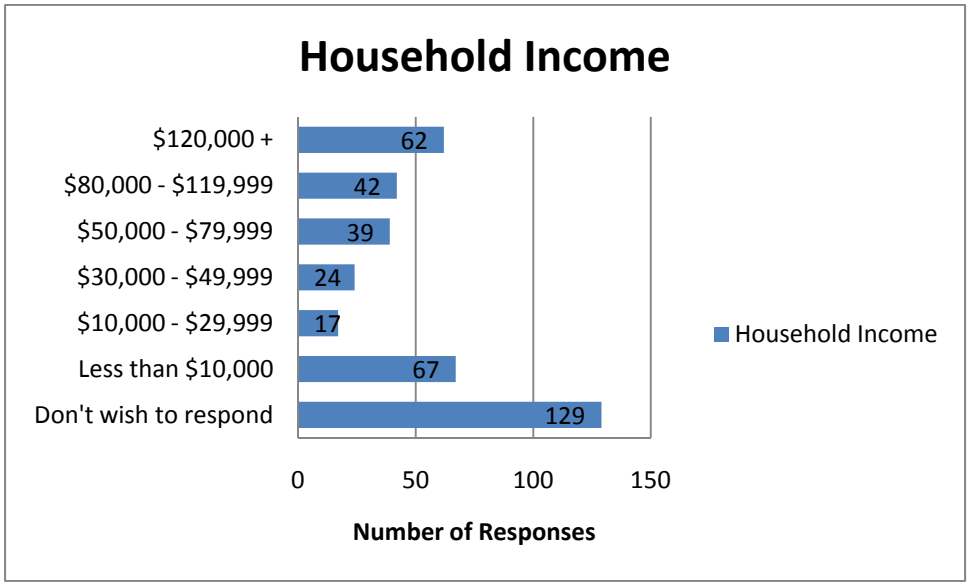
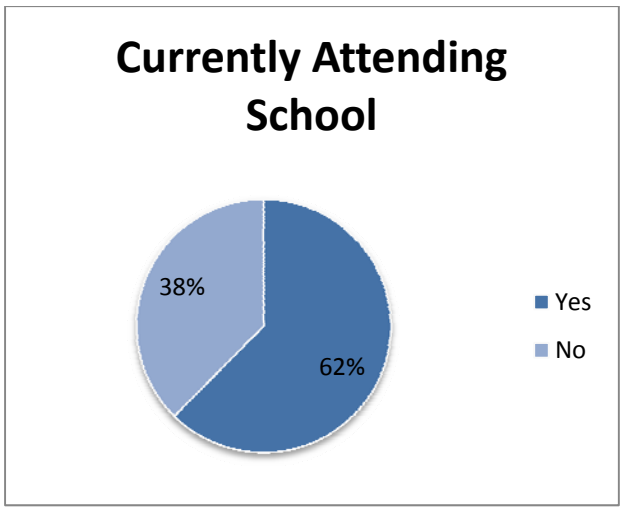


Figure 20 - Primary Survey Household Income Responses

The survey had a bias towards those who are currently a student. Of the 380 people surveyed 237 where currently a student. The remaining 143 were not students. Of the responses, 14 did not respond to their level of education, 213 have completed high school, 27 have associates degrees, 62 have bachelor's degrees, 36 have masters degrees and 24 have doctorates. No responses were reported for "no formal education" or middle school as the highest completed level of education.

Figure 21 - Primary Survey Student Status Responses



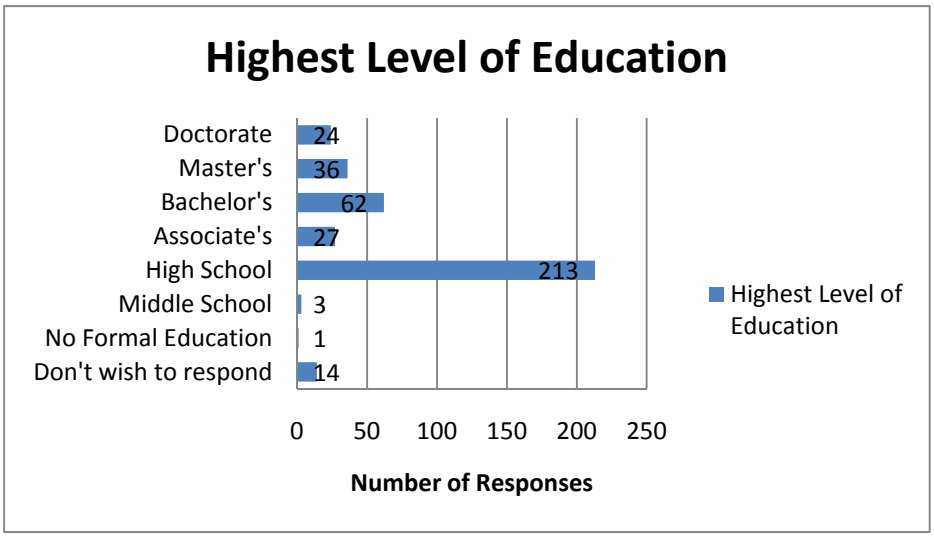


Figure 22 - Primary Survey Education Level Responses

Twenty-six people chose not to respond to what their career is. Forty people reported that they worked in education. Seventy-seven responses indicated that they worked in an engineering field. One hundred and twenty-three of the responses were students. All other categories contained less than 20 responses and a full break down can be viewed in the appendices. This data shows a large bias to both people in education, educations, and engineers.

For housing, 122 replied they live in an apartment. Fifteen replied that they live in a condominium. One hundred and seven live in dormitories. The remaining 134 live in homes. There was no option for no response on this question.

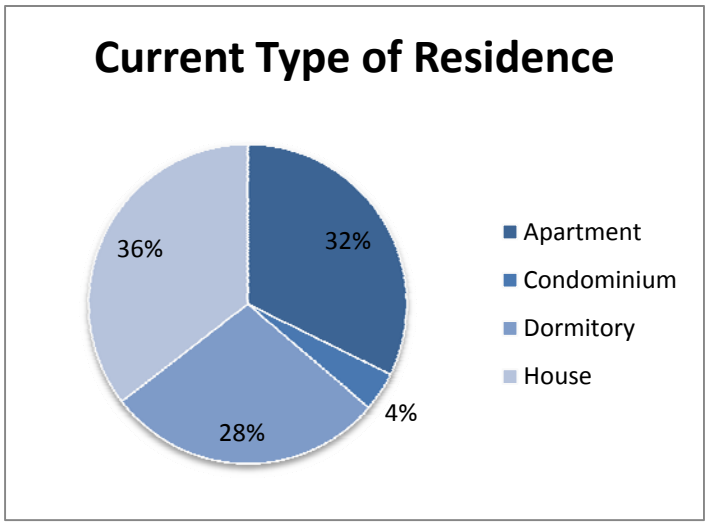
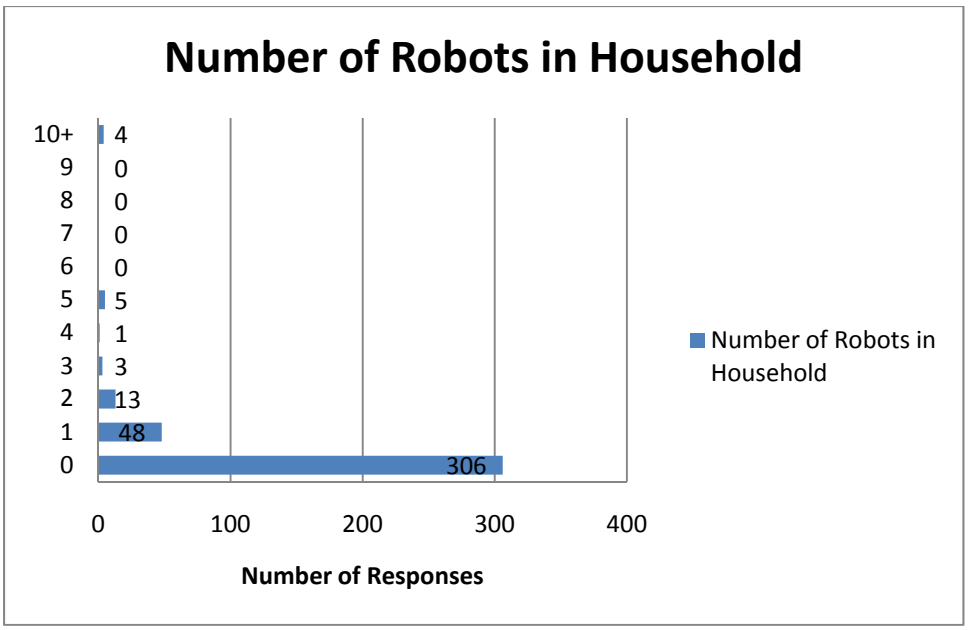


Figure 23 - Primary Survey Current Residence Responses

Most people surveyed do not own a robot. Of the 380 surveyed, 48 owned one robot, thirteen owned two robots, three owned three robots, one owned four robots, five owned five robots, and four owned ten plus robots. Of these robots 51 responded that they are used for cleaning, 28 responded that they are used for entertainment, 2 are used for lawn care, and 5 for security. Twelve people responded that their robots are used for other activities.

Figure 24 - Primary Survey Robots per Household Responses



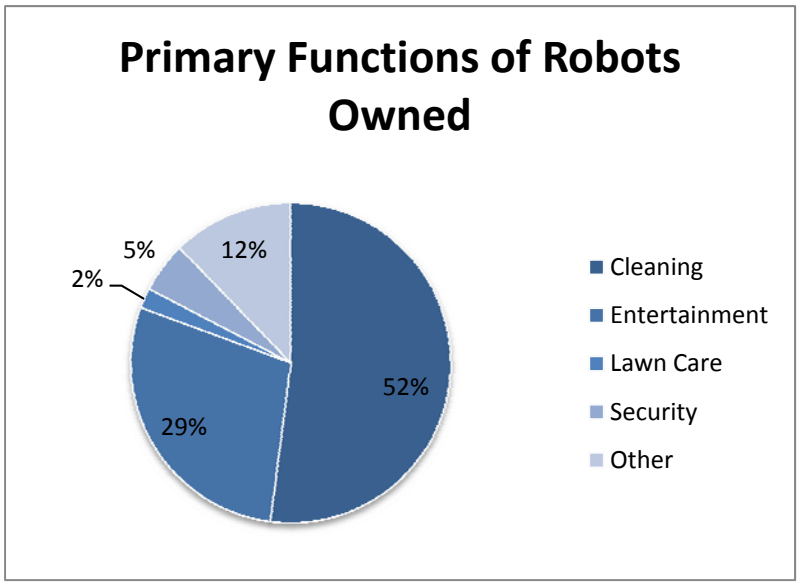


Figure 25 - Primary Survey Household Robot Functions Responses

Most people surveyed are not willing to pay over 99 dollars for any of the robots listed in the survey. The two most popular robots that some are willing to pay large amounts of money for are lawn care, and elder care robots. The survey also shows that very few are willing to pay for a robotic pet unless the price was low. In general any robot that accomplished routine or boring tasks had a very high desirability.

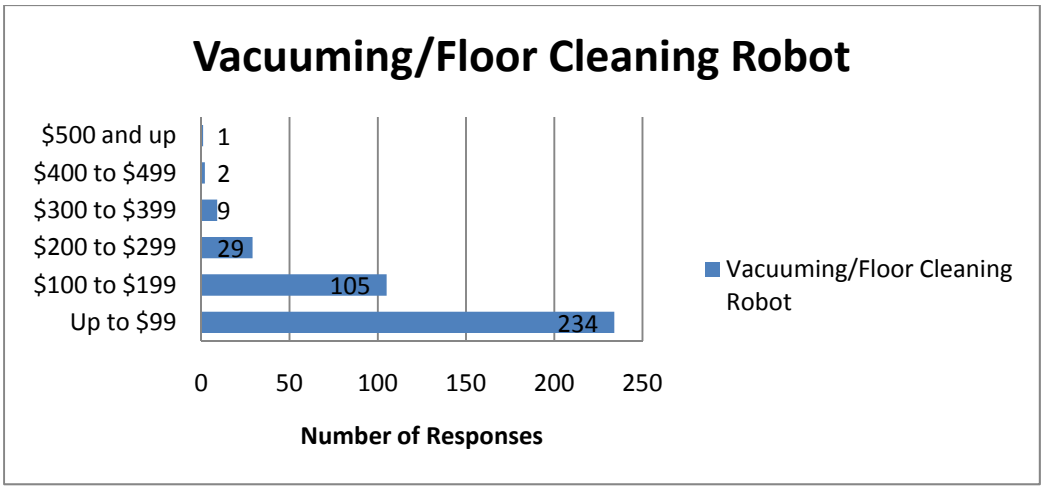


Figure 26 - Primary Survey Vacuuming Robot Desirability Responses

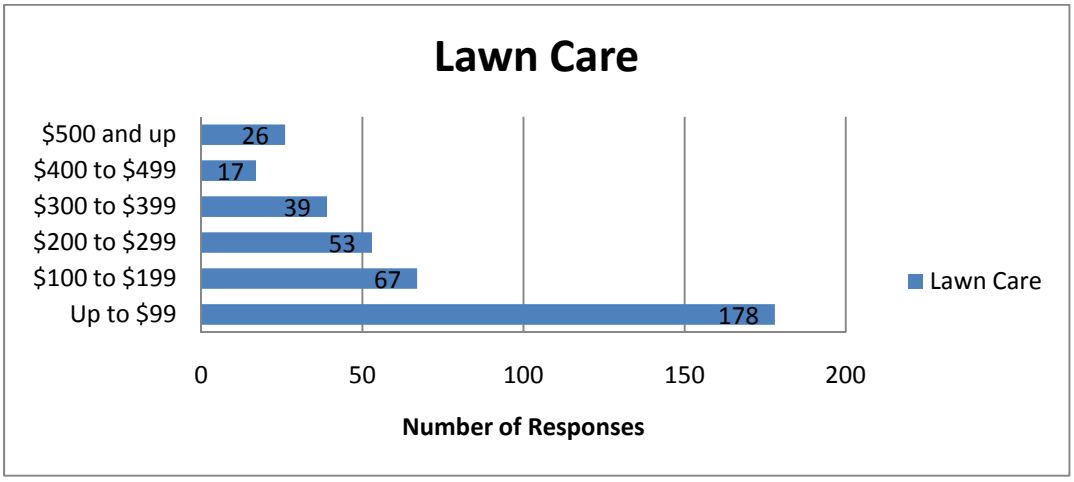


Figure 27 - Primary Survey Lawn Care Robot Desirability Responses

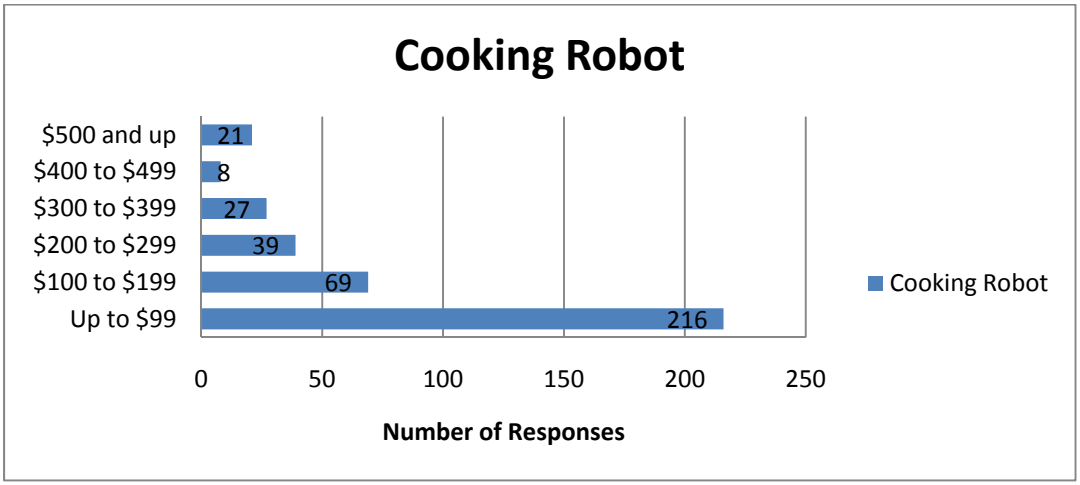


Figure 28 - Primary Survey Cooking Robot Desirability Responses

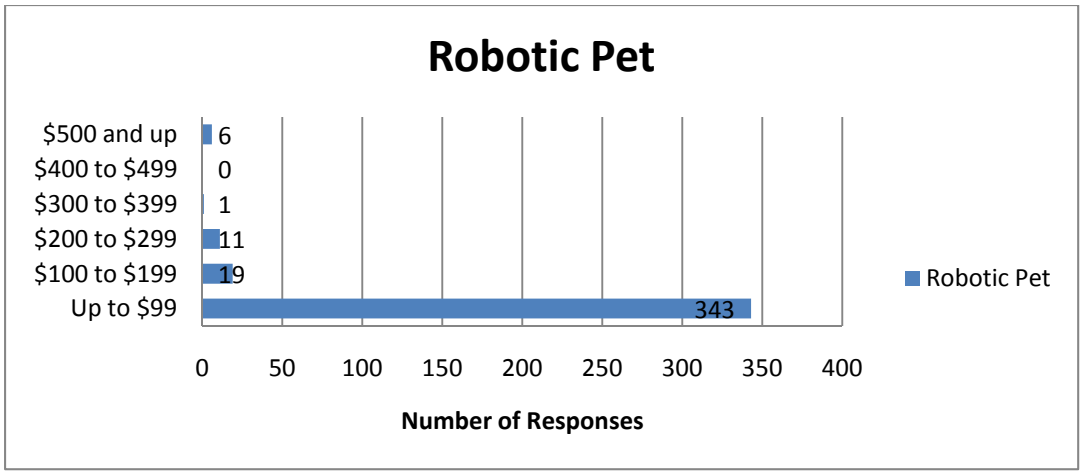


Figure 29 - Primary Survey Robotic Pet Desirability Responses

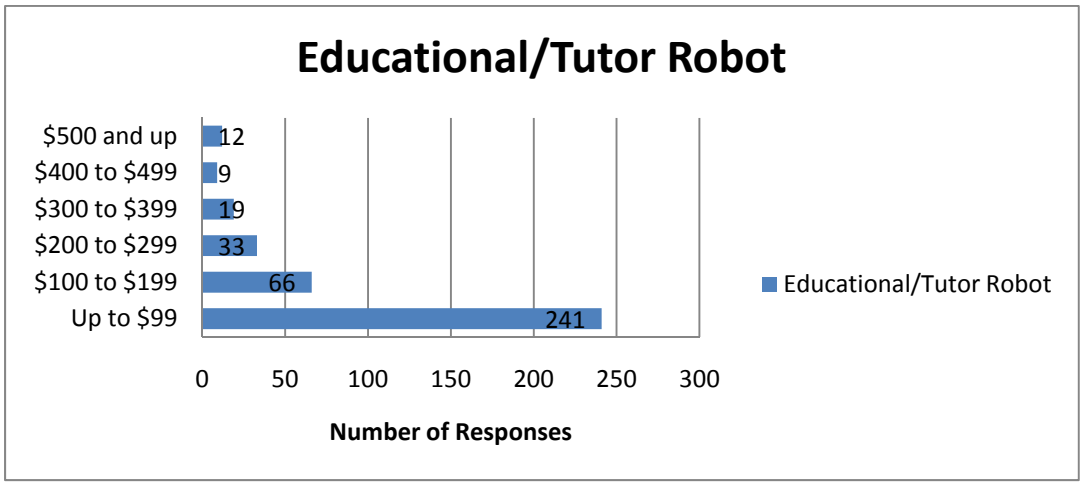


Figure 30 - Primary Survey Educational/Tutor Robot Desirability Responses

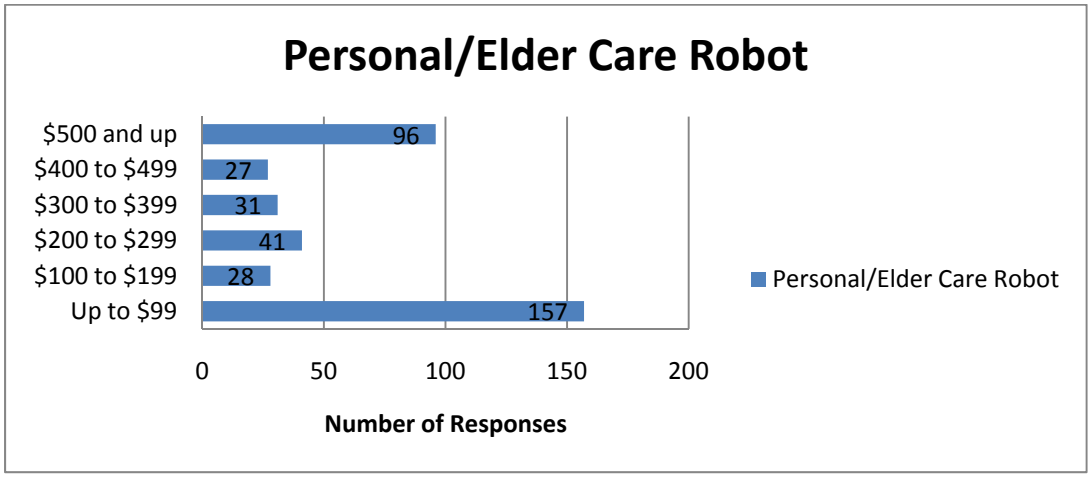


Figure 31 - Primary Survey Personal/Elder Care Robot Desirability Responses

The free response section which asked the question "What would you like to see household robots be able to do?" had 199 non responses. Twelve people want robots that cook meals for them. Twelve people also want personal assistant robots that would follow them and be their personal assistant, such as helping with basic tasks, providing information, and acting as a scheduler for the owner.

Many people want robots that clean for them. Eight people want robots that clean bathrooms, 4 people want robots that clean and wash their cars. Twenty Five people wanted robots that would wash their laundry, sort it once it was dried, fold it, and then properly store it back in its correct places. Twenty people want robots that will clean their homes in general such windows, floors, walls and dust shelves and other areas in their homes.

There was also a demand for robots that do standard house-hold chores such as making beds, bringing out trash and recycling, doing the dishes, mowing lawns, chopping and stacking wood, removing snow from drive ways and roofs, and taking care of daily garden maintenance such as weeding and watering.

Many people replied that not only elder care should be considered but taking care of disabled people, watching children, and dispensing medication as well. People also wanted robots that cared for their pets, such as feeding them, cleaning liter boxes, walking them, playing with them if they are bored, and alerting the owner of any issues.

People want robots that maintain home security, such as watching for intruders, checking carbon monoxide levels, fire detection, temperature monitoring, and other safety and security concerns. The participants claim that there are not many, if any, options currently available on the market to accomplish this task.

There were also those who are opposed to having robots do any work that a human would normally do. Twenty five people said that they had no wish in consumer robots at this time. Two said

that robots are fine to complete repetitive tasks but should not replace human to human interactions such as elder care and tutoring. Two people said that robots must have direct human control for them to want them in their house and view many of these consumer robots as an added danger in their home. Many of these people quoted or mentioned science fiction movies or novels as their reason for fear or dislike of robots.

There were also some responses that stuck out from the many norms that were observed. Three people wanted robots that would give them sexual pleasure. One person wanted a robot that had alchemical properties and was able to turn trash into gold. Two people wanted robots that would only do violent things to people they did not like. One person wanted a robot to convince his wife to have sex with him. These responses will be scrutinized in the analysis section.

Short Survey Results

The short survey that was handed out at the FIRST Regional competition at Worcester Polytechnic Institute had a much smaller base of responses. There were a total of 19 responses from the regional. Of those responses 16 were male and only 3 were female. The majority of the age group sampled was in 13-25 years old, with a small minority being between 46-65 years old. There were no responses in the 26-45 brackets as well as in the 66 plus brackets. This was to be expected due to the age demographic of the FIRST competitors.

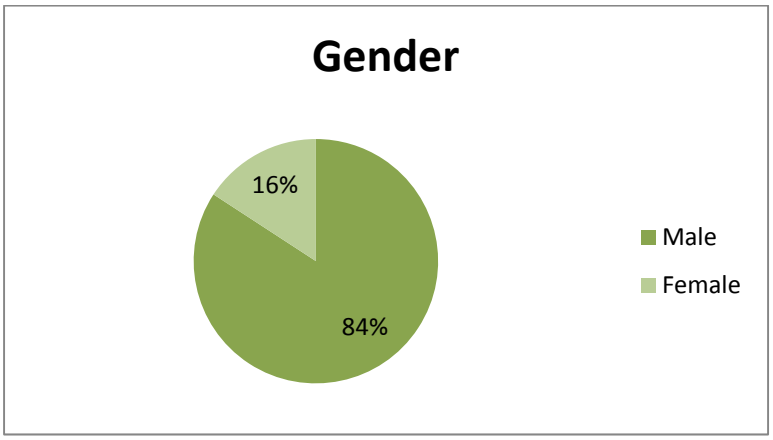


Figure 32 - Secondary Survey Gender Responses

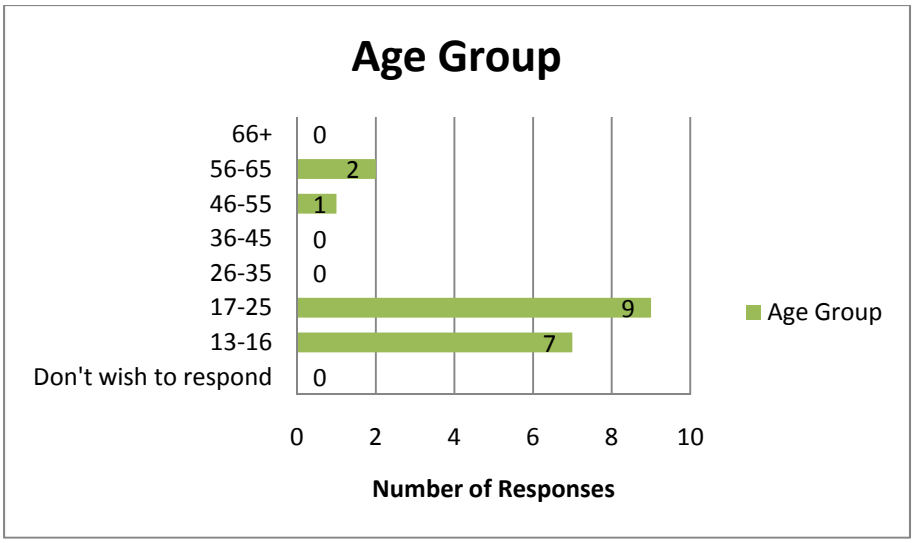


Figure 33 - Secondary Survey Age Responses

The prevalence of robots in households was still low. Sixteen of the response said they had no robots in their homes. One response said that they had one robots and one response said they had two robots.

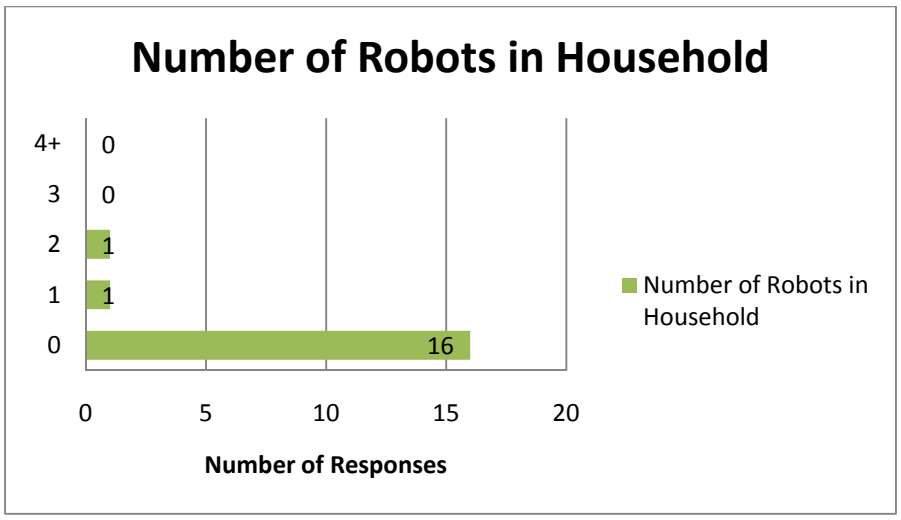


Figure 34 - Secondary Survey Robots per Household Responses

The desirability for different types of consumer robots was rather high. The most desired robots were the lawn care robot, the cooking robot, the tutoring and teaching robot, and the elder care robot. The robotic pet was the least popular but had a few people willing to pay a large sum of money for it.

The vacuuming and floor cleaning robot had good demand but people would not be willing to pay a considerable amount for them.

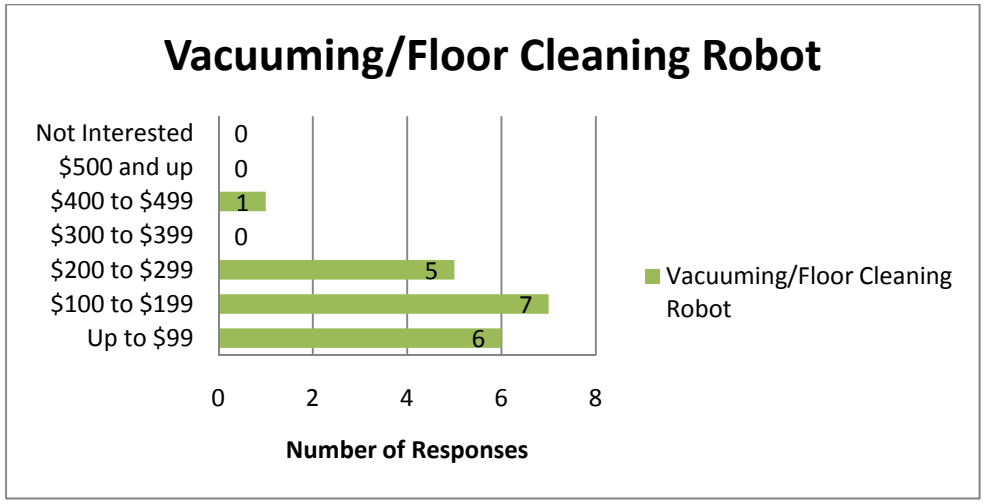


Figure 35 - Secondary Survey Vacuuming Robot Desirability Responses

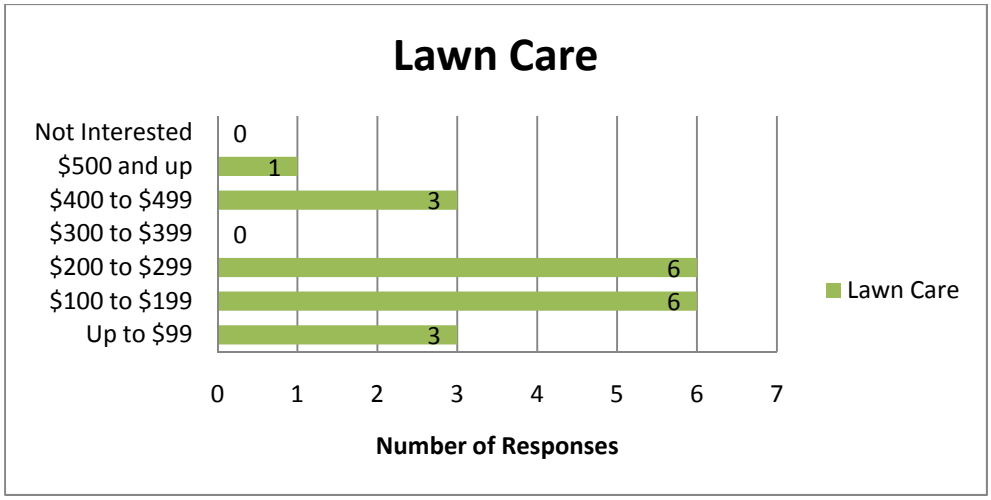


Figure 36 - Secondary Survey Lawn Care Robot Desirability Responses

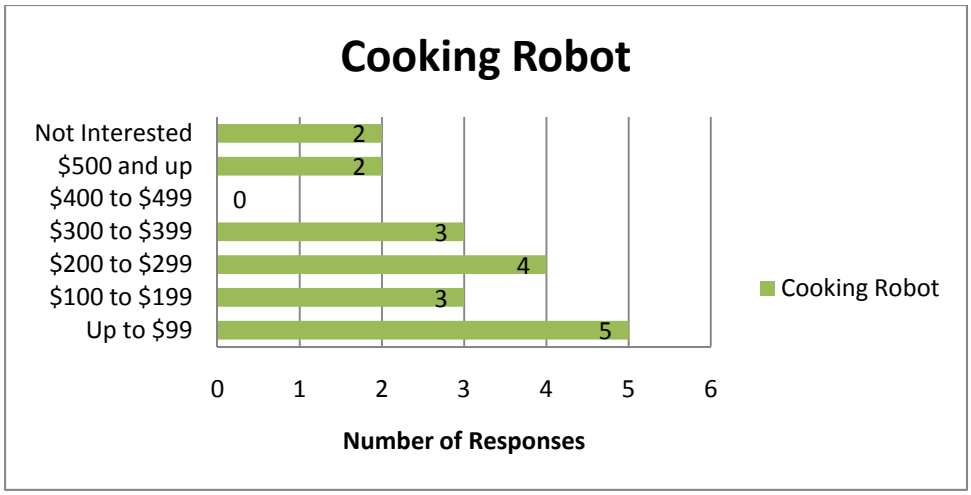


Figure 37 - Secondary Survey Cooking Robot Desirability Responses

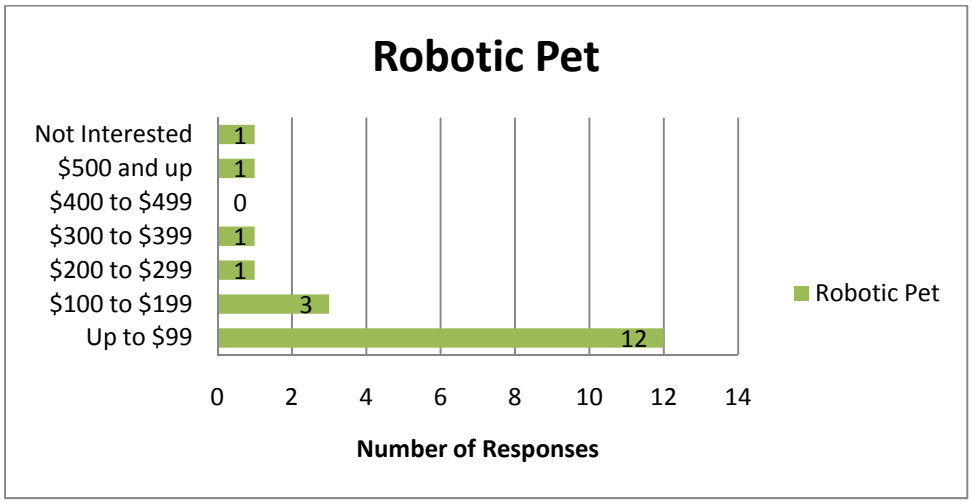


Figure 38 - Secondary Survey Robotic Pet Desirability Responses

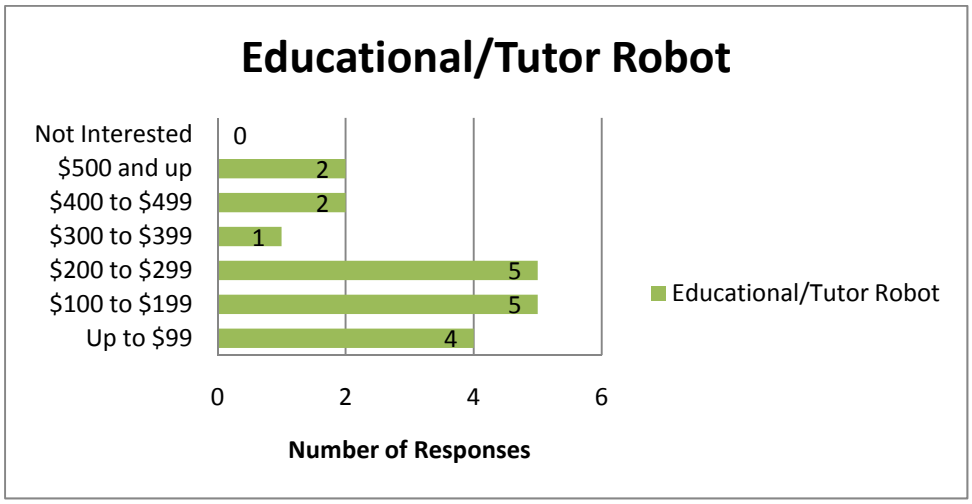


Figure 39 - Secondary Survey Educational/Tutor Robot Desirability Responses

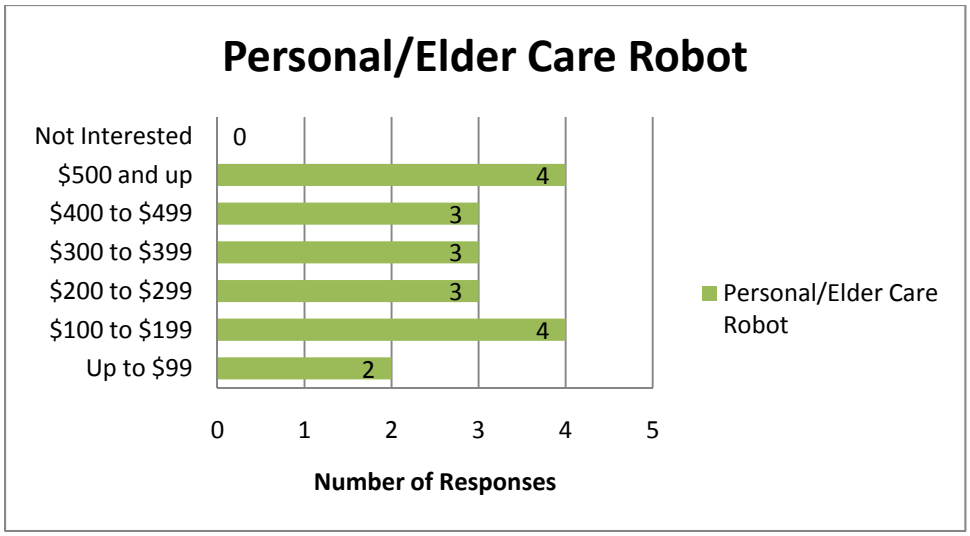


Figure 40 - Secondary Survey Personal/Elder Care Robot Desirability Responses

IV – Analysis

The results from our primary survey showed that 19% of those surveyed live in a household that owns at least one robot. This is an impressive figure, but probably not representative of the general population of America. Biases in both income and age (discussed later in this section) most likely played a role in inflating this number slightly. Even if true, this figure shows that robots still have a long way to go before reaching a level of household acceptance equal to that of other major technological innovations such as the personal computer or cell phones.

Despite our attempts to eliminate biases in our survey results, such as sending it out to a broad audience through Facebook.com and encouraging people to send it to their friends and relatives, some bias still occurred. By sending the survey out to the WPI campus, many of our responses came from students. With 63% of those surveyed responding that they were between the ages of 17 and 25, there is a major age bias toward younger people. The survey also only had five responses, or 1% of the total, from those over the age of 66. If the number of responses from people of each age group was more representative of the actual United States population, the percentage of households with robots would likely have been much lower.

According to responses, 20.75% of 17-25 year olds, 28% of those aged 26-35, 16.7% of 36-45 year olds, 17.8% of those age 46-55, and 11% of those age 56+ claim to own at least one household robot. Subjects age 26-35 responded with the highest percentage of robots per household most likely due to both their young age and steady employment, unlike most subjects that responded in the 17-25 age group, 92% of which responded that they were still students. Biases may also have occurred due to the uneven distribution of responses from people with different income levels and occupations. The heavy weight of 20% responses from people in the engineering field may have artificially inflated the results pertaining to the percentage of household containing robots.

Along with biases effecting results, the surveys also contained some responses that were superficial. This is due to the fact that people are tired with the number of surveys they are requested to fill out and want to have fun at the expense of the research group. The most prominent example of this is a responder who modeled his response after the cat lady from the Simpson's television show and the free response said that they wanted a robot for sexual companionship. There is also a response that wants a robot that is able to kill John Conner, which is obviously referring to the Terminator franchise. These occurrences were few in number and had little effect on the results of the survey and were easy to locate in the free responses. They were removed from the free response analysis but their other question responses were left in for statistical analysis.

There were also responses who claimed to have over ten robots in their house hold. Though this may not be true there is no definite marker to identify this by and it does not greatly affect the results as a whole. The trends of lack of prevalence and a growing demand for some types of robots are still easily observed.

Current Demographics of Robot Owning Households

The survey results show that 81% of robots are used primarily for either cleaning or entertainment purposes. The survey also showed that 64% of the people surveyed do not live in homes. People living in dorms, condos and apartments have no use for lawn care or security robots because the owners of those buildings are responsible for those tasks. The people living in their own houses are the only people who would have use for lawn care or security robots, but they would also be able to use entertainment and cleaning robots. The people who are living in other forms of housing also have uses for entertainment and cleaning robots, which is why those two types of robots are found in households more frequently than other types of robots.

Analysis of Free Response

The free response section had interesting results that did not fall in line with the question that was proposed to the subject taking the survey.. A large number of the people who responded to the survey chose not to type anything into this field, but this was to be expected in any form of survey where there are both selectable and open ended fields to answer. The responses we did receive had a mix of both positive and negative comments.

Many of the issues that were stated in the free responses were due to people not taking the time to read the entirety of the survey or the paragraph that introduced the topic of the survey and the definition of what a robot is. This caused a considerable amount of the free responses to be comments about what people thought was wrong or missing in our survey and not what was actually asked in the question. This issue could be lessened if this survey was conducted again by putting the information on a page prior to the survey in order to get people more likely to read the paragraph before continuing on to the survey.

The free responses included a large number of people who said they would be more likely to buy a consumer robot such as the Roomba, if it was better at its job and able to learn from what it was doing. The responses also wanted robots that could multi task and perform more operations. This would be due to the fact that someone is more likely to buy something that is able to do many things than if it can only do one thing, this is especially true for devices that are expensive such as some of the robots that currently exist on the market.

Twenty five people who responded that they did not wish to own a consumer robot did so because in their opinion robots should not replace human to human interaction, or even any task that a human could accomplish. This was surprising considering the majority of the survey base being of engineering in background. There were also a large number of people who replied that they are afraid

of robots becoming too involved with humans and eventually causing issues. This is very popular in current entertainment and culture and likely biased part of the population to be anti-robot.

On the other hand some people have more confidence in robots and want to see them do more. Many people also wrote in that they wanted robots that could accomplish complex tasks such as driving a car. Even though this is not possible in the near future it will likely become possible soon and it shows a trend that some people do want more complex robots. At some point people want to see robots able to automate home and garden maintenance as well as babysitting and pet care.

The responders also wanted to see robots doing more work that would have been considered chores, such as cleaning homes, cleaning dishes, do laundry and other tasks like this. Though it is also seen that the people would most likely not be willing to pay too much money for robots that accomplish these tasks because of the prices they were willing to pay for a device such as a vacuuming or floor cleaning robot.

Three of the responders were interested in robots that would be able to grant sexual pleasure to them. Though this may sound rather odd at first there has been some developments in the news recently about Roxxxy, who is a working sex robot that will enter the retail market for around $7000. This robot is already making a considerable amount of buzz in the news and will end up leading to more robots like this[29].

For continued growth in the prevalence of consumer robotics in households to occur, the fear of robots needs to decrease, the reliability of the robots needs to increase, the abilities of the robots need to improve but most of all, the cost needs to come down significantly. These factors will likely occur at the same time because as better robots come onto the market, the older robots will become cheaper, making them both more available and appealing to a wider market.

Robotic Pets

The data collected showed that there was a lack of demand for robotic pets. This can be attributed to the lower price of adopting animals. A few of the responses preferred real pets on the fact that they feel a greater connection with a living thing and that a robot can't show affection. In order for people to be interested in a robotic pet it would have to be below 100 dollars. Anything above this point there is not enough interest in the product for it to possibly do well.

Fear of Robots

The results of the survey distributed by SotA showed that only a small portion of people own robots. There could be a number of reasons why people do not own robots, but one large contribution may be the general populace's apprehension of robots. There are two major factors that directly affect human opinion of robots: the media portrayal of robots via movies, television and books as well as the uncanny valley.

Robots are a frequently included in the popular mediums such as television and movies. The way robots in the media are consistently portrayed as violent and destructive. Regardless of the genre of media, be it comedy, drama, action or horror, robots are shown to be evil.

The Stepford Wives, a movie released in 2004, is a satire in which the town of Stepford is portrayed as ideal, where everyone is happily married and friends with everyone in the community, but in fact is a town controlled by a robot that enslaves the citizens by implanting computer chips within their brains. The story is farfetched, but it plays on people's fear of losing their freedom[30].

Two major science fiction series focus intensely on the fear of human extinction. The first series was the *Terminator* movies. In them a computer program took control of all technical devices across the globe. It then created robots and used those robots to wipe kill all humans. The *Matrix* series is similar in that humans created robots with artificial intelligence and then those same robots started killing all

people. These movies also cause people to associate robots with destruction because the wars fought in both series result in catastrophic damage being done to the world[30].

Surrogates and *I, Robot* both create a world in which humans have created robots to act as servants in society. In both movies, control of the robots is lost and the result is chaos and people dying. These movies cause people to associate robots with social upheaval and rebellion.

One movie that portrays robots in a different manner is *WALL-E*, a children's movie by Disney in which a robot named WALL-E is left to clean up the mess left by humans. WALL-E is a curious and friendly robot who finds love and overcomes adversity to be with the robot he loves. As a children's movie, the majority of viewers are children who are unlikely to be purchasing robots and as such the positive portrayal of robots in this movie would be highly unlikely to influence consumer decisions.

The Uncanny Valley is a theory regarding a phenomenon in robotics. According to the theory, as robots become more and more lifelike, human familiarity increases until the Uncanny Valley at which point it plummets before rising back again[31]. This phenomenon can be seen in the chart below. The theory is based on a few things, two of which are directly related to human fears. Mortality salience is the theory that similarities between humans and robots cause humans to project different aspects of

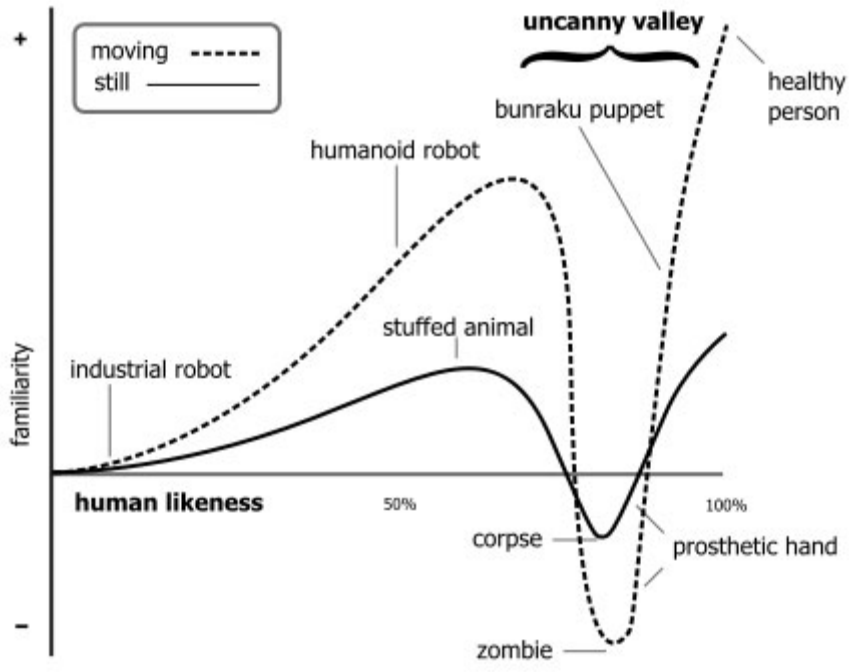


Figure 41 - Uncanny Valley

http://kyleriedel.net/shuffle/wp-content/uploads/2009/05/uncannyvalley1_422x330jpg.jpeg

the robots onto themselves[31]. The theory claims that seeing robots in assembly or in the process of being fixed reminds people of their own mortality and the general jerkiness of android motion plays on the fear of losing bodily functions. The other major theory, pathogen avoidance, claims that people may have evolved to find defects aversive as a means of self defense to avoid diseases and other afflictions that cause defects in people[31].

Demand for Elder Care Robots

The results of the survey indicated that the majority of people are willing to pay only up to $99 for all types of robots. The one type of robot that a large portion of people were willing to pay more for was elder care robots. The largest reason people would be willing to spend more money on elder care robots is the fact that elder care is so expensive. Research shows that keeping an individual in a nursing home can range from between $60,000 and $120,000 annually. With the cost of nursing homes being so expensive, it is very clear why people would pay so much for an elder care robot. Another reason and a robot is that the robot would provide one on one support twenty four hours a day. At a nursing home, there is one staff member for every ten patients. Since a robot could provide better support and cost less than alternative methods, it is apparent why people would be very interested in robots taking care of the elderly[32].

Differences between Primary and Secondary Survey Results

The two surveys conducted were filled out by two distinctly different groups of people. The initial survey was sent out to a large number of people from different backgrounds. The second survey was handed out to a small number of people at the F.I.R.S.T. Regional competition at WPI on March 13th, 2010. While the surveys were distributed in a different manner and to different people, the majority of the populace was under the age of 25.

The second sample was only distributed among members of the F.I.R.S.T. robotics community. Since the community is based exclusively around robotics competitions, it stands to reason that the members of the community appreciate robots. This appreciation biases their responses in favor of robotics, which may suggest why they were as a percentage, willing to pay more money for household robotics.

The first survey that was sent out hit a larger population. A lot of responses came in from the WPI campus; these responses are expected to have similar biases as the second survey. The Facebook responses are from people with a greater range of education, age and background. As such, the only factor binding them together is that the users of Facebook tend to be of younger ages. This means that they are more likely to have open minds about new ideas and concept. This would most likely make them more receptive to robots being introduced into their homes. The last demographic of people hit by this survey was a middle to late age population. They were reached by sending the survey to a couple of companies. The people from this age are most likely settled into their way of life and would dislike their routine to be interrupted by robots. As such, they would most likely be biased against robots.

There were two major findings as a result of the comparison between the two surveys. The most noticeable discovery was that the number of robots owned by the F.I.R.S.T. community, a community focused on robotics, tended to own the same number of robots as the first survey's community. Both populaces were found to have either zero or very few robots in their household. This was surprising because it would seem likely that the community that was largely focused on robotics would tend to own more robots in their home, but instead tend to have the same amount. The second thing discovered by comparing the two surveys is that the F.I.R.S.T. community was willing to pay more for each type of robot than the general community. This is surprising because in general, people in high school (F.I.R.S.T. community) have less money to spend. It would stand to reason that having less money would cause a person to want to spend less money on a luxury like a robot. The sentiments expressed by the F.I.R.S.T. community may be accurate, but it also might be the result of their youth. At the age of most of the high school students, most of them will not have made many large monetary transactions. This could have prevented them from fully understanding the amount of money they claimed they would be willing to spend on each type of robot.

V – Recommendations

The results showed that

- There was little prevalence in consumer robotics in current households.
- People do not like robotic pets.
- There are large demands for elder care, cooking, and tutoring robots.
- People will buy most robots if they are of a sufficiently low price.
- Some responses fear robots as they are new technology that has been made evil by popular culture.

A major issue found from the results was a lack of prevalence of consumer robotics in house hold. Currently, there are very few advertisements for consumer robots. The only well known consumer robot is the Roomba, produced by iRobot, which has been previously discussed in this report. To remedy this companies that produce these robots need to advertise more to increase public awareness of their products and increase the overall sales of their products. Increased sales would lead to a higher prevalence of these robots in people's homes and would lead to a greater acceptance of robots in households. This is only part of the solution though; people have to also see more robots in action in order to be more accepting of them.

A proposal to solve this issue would be exposing younger children to robots in such situation as cleaning schools or other public facilities, and having grants to get robots into the class room in high schools. A good example of an activity like this that already exists is FIRST. This is helping expose elementary to high school students to robotics, engineering, and technology. More programs such as this could be used to help people be more accepting of robots in their households doing many tasks.

With the exception of cooking and elder care robots, the collected surveys indicate that most people are unwilling to pay a lot of money for consumer robotics. A solution to this problem would be to combine similar consumer robots so that instead of having single functions, they could perform a variety of tasks. A good example would be a general purpose cleaning robot. There are already robots that vacuum floors as well as robots that can mop floors. Making a robot that could vacuum the floor and

then mop it would be beneficial to the consumer in two ways. First off, by only having to purchase a single robot, the consumer will likely have to spend less money on the initial purchase, as well as yearly upkeep. The second benefit is that the consumer will only have to worry about storage space for a single robot as opposed to a pair of robots. Similar combinations could be found in a variety of consumer robotics. With robots cheaper and capable of completing more tasks, it is more likely that people will purchase them.

Some areas showed a demand that was much higher than the others that were surveyed. These included elder and personal care robots as well as cooking robots. Overall in North America there was little found in the way of these two types of robots. If a company was to produce such a robot it would likely sell very well and could produce a large profit for the company as well as filling a need of the consumer.

One means of increasing the acceptance of consumer robotics would be to remove them from the Uncanny Valley. As fully explained on the bottom of page 31 and the top of page 32, under the heading of "Fear of Robots", a major cause of the public's fear is the Uncanny Valley. The Uncanny Valley is the phenomenon where robots become realistic enough that humans are no longer comfortable with them, but are not realistic enough for people to relate to them. To increase the acceptance of robots, companies should attempt to avoid robots falling into the Uncanny Valley. One example of a robot that falls into the Uncanny Valley is the Japanese robot Saya.

Figure 42 - Saya

http://assets.nydailynews.com/img/2009/03/12/amd_robot_teacher_mad.jpg

As the picture shows, the robot has individually realistic features, but as a whole it looks more like a corpse than a person, as such it is very unsettling to see. A robot that is less likely to cause unease would be Willow Garage's PR2.

Figure 43 - PR2

http://botropolis.com/wp-content/uploads/pr2_conceptc400x252.jpg

The PR2, possesses humanoid features such as an arm, torso and a head. While it has features that humans also possess, the PR2 does not look remotely like a human being. The dissimilarities between the PR2 and humans move the robot out of the Uncanny Valley and place it before the valley, so that it is accepted by humans even if it is not realistic. If companies move towards creating robots similar in appearance to PR2 and less like Saya, then the public will be more comfortable and therefore accepting of consumer robots in their households and would be more likely to buy them.

Robotic pets are a product that robotic manufacturers are advised to avoid. Surveys revealed that consumers own very few and are willing to spend very little on robotic pets. There are several reasons why people are unlikely to be interested in robotic pets. The majority of current robotic pets are extremely expensive, rendering them in the same price range as personal computers and household appliances. When people have cheaper methods of entertainment, why would they spend it on a robot? Another problem is that the majority of people purchasing robotic pets, parents, grew up in a time period when robots were fictitious characters only, and malicious characters at that. These two reasons cause the majority of robotic pets to be unwanted products, but there are solutions that could increase

the market for these pets. One robotic pet that sold successfully was the Furbie. Furbies were extremely different from other robotic pets in two distinct means. First off, they were cheap, costing a fraction of competing pets. Secondly, Furbies do not look or move like robots. By removing the association to the media portrayed robots, Furbies were seen as harmless and friendly. Companies should either design robotic pets similar to Furbies or should wait until utilitarian robots are accepted into homes. This would familiarize consumers with robots and make them more comfortable with accepting robotic pets into their homes.

There are some changes that could be made to improve this project if it was to be done again. The first area that would need to be improved would be the survey. The survey was achieved its goals reasonably well but could do better in a future iteration. The changes that would be need to the survey include making the directions shorter, clearer more precise. Modifying the possible answers to the questions to include a response of "I would not be interested in this product" would allow people to show that they have no interest in a product where as the current iteration of the survey lacks this feature. Finally, finding a better method to distribute the survey to a greater number of people of a more varied demographic will help remove some of the bias in the results. The survey results showed a bias towards college students. This can be attributed to the large amount of responses gained from the email to the students at WPI and the relatively few responses received from the Facebook.com survey.

VI – Conclusion

This project has focused on the current state of consumer robotics from the users' point of view. The research methodology involved a survey distributed to a sample population. This survey determined prevalence and demand for consumer robots in the population. The data collected by this survey was then analyzed.

The major findings of the study are that there is currently very little prevalence of robots in homes and that each type of robot has a very different demand associated with it. It was also noted that development needs to be done into robots that can do many things not just one task but are more apt to buy a robot that can do multiple tasks such as the PR2. Finally, a set of recommendations were developed based on these results in order to try to make consumer robots more prevalent and popular with the community.

This project was a great learning experience for all three student members of the research team. The team learned much about the field of consumer robotics but more importantly learned about the social implications and interconnections of society and technology. The team also gained experience in administering surveys and analyzing the results statistically.

This project successfully achieved the goal that was established. The results showed a lack of prevalence of consumer robots in households as well as a demand for more robots at lower prices. There were a few issues with some aspects of the project but none of these issues prevent the team from achieving its goal. The robotics industry is ever changing and these findings are only accurate for the time in which this project was conducted and for future information this project should be repeated to find more current information. Consumer robots will become an increasingly common sight in households around the world as they become both cheaper and more sophisticated devices.

Appendix A – References

[1]Mataric, Maja J.*The Robotics Primer*. Cambridge, Mass.: The MIT Press, 2007.

Provides background information on robots and modern definition of a "robot"

[2]"iRobot Corporation." iRobot Corporation. © 2009 <www.irobot.com>.

Creator of many common household consumer robotics. Website discusses their business plan as well as outreach programs they have in place. Can be used to view annual financial reports.

[3]"Automower." Husqvarna Inc. <http://www.automower.us>

US version of Husqvarna's official Automower site. Can also access press briefs released from Husqvarna.

[4]"The World First Dryer and Iron Machine." Appliancist. Dec. 2th 2007.

<http://www.appliancist.com/appliance_trends_2007/fagor-driron-2007-world-first-dryer-and-iron-machine.html>.

Appliance news site doing a short brief on the DrIron by Fagor.

[5] Fogarty, Kevin. "Service Robotics: Korea Puts $750M in Robotics, Aims to Lead Market by 2018 | Robotics Trends." *Robotics Trends*. Web. 2 Dec. 2009.

<http://www.roboticstrends.com/service_robotics/article/korea_to_put_750m_in_robotics_industry/>.

[6]"Intuitive Surgical, Inc." Intuitive Surgical, Inc. <http://www.intuitivesurgical.com/index.aspx>.

Provides information on the da Vinci Surgical "Robot"

[7]"Apple Inc." Apple Inc. <www.apple.com>.

Information on the iTunes Genius algorithm for song selection and playlist creation

[8]The National Science Foundation. <http://nsf.gov/>

Government organization that openly funds many different projects. Used website to find plans and amount that they are currently funding operations. Able to view abstracts of all projects due to this being a publicly funded group.

Hart, David. "Robotics: Overview: The Quest for Intelligence:". National Science Foundation.

<http://www.nsf.gov/news/special_reports/robotics/overview.jsp>.

Outlines much of the developments in robotics in the United States and the primary areas that are being developed.

[9]The Defense Advanced Research Projects Agency. <http://www.darpa.mil/>

Primarily a defense oriented organization, but much of their developments will filter down to consumer electronics in the future so their website can be used as a way to see into new technologies that are being developed.

[10]"Evolution Robotics" <http://www.evolution.com>

Lots of information on telepresence robots.

[11]Human Factors and Ergonomics Society. "Older Adults Want Robots That Do More Than Vacuum, Researchers Find." ScienceDaily 16 October 2009. 21 December 2009 <http://www.sciencedaily.com/releases/2009/10/091014102203.htm>.

Article discussing the consumer wishes in robots from research done into what older adults desire to see in their robots.

[12] "Willow Garage" Willow Garage Inc. <http://www.willowgarage.com/>

California based robotics company with many new ideas. Makes the PR2 platform. Example of the cutting edge in consumer and personal robotics.

[13]"Zucchetti Robotica Ambrogio." Zucchetti Robotica. 2009.<http://www.roboticazucchetti.it/robotica/jsp/index.jsp?id=default>.

Creator of the Ambrogio lawn mowing robot. Information on its operation and features as well as different models.

[14]"Trilobite." Electrolux Inc. <http://trilobite.electrolux.com>

Site with information on the Electrolux Trilobite 2.0.

[15]"RC3000." Karcher North America Consumer Products. <http://www.karcherresidential.com/en/showproducts.php?op=view_prod&param1=143&param2=&param3=>

Karcher North America's RC3000 Robotic Vacuum site.

[16]Aschenbrenner, Norbert." Dressman Irons Shirts with Hot Air." Siemens. Feb. 6th 2004.

<http://w1.siemens.com/innovation/en/news_events/innovationnews/innovationnews_articles/dressman_irons_shirts_with_hot_air.htm>.

Short news brief from Siemens about the Dressman.

[17]"Robosoft Advanced Robotic Solutions." Robosoft. <http://www.robosoft.com/eng/index.php>.

French Robotic platform development company. Site features may press briefs from events they attended with their robots.

[18] Xu, Yangsheng, Ben Brown, Samuel Au, G. C. Nandy, Yongsheng Ou, and Cedric Law. "Single Wheel Robot." *Advanced Robotics Lab*. The Chinese University of Hong Kong. Web. <http://arl.acae.cuhk.edu.hk/>.

The intended uses and features of the Single Wheel Robot are explained on the Advanced Robotics Lab website.

[19] Xu, Yangsheng, Huihuan Qian, Bufu Huang, and Xi Shi. "Petsitter." *Advanced Robotics Lab*. The Chinese University of Hong Kong. Web. <http://arl.acae.cuhk.edu.hk>.

The capabilities and uses of Petsitter are revealed on the Advanced Robotics Lab website.

[20] Xu, Yangsheng, Michael Nechyba, K. K. Lee, Qi Wang, and Cedric Law. "Smart Wheelchair." *Advanced Robotics Lab*. The Chinese University of Hong Kong. Web. <http://arl.acae.cuhk.edu.hk>.

The benefits and applications of the Smart Wheelchair are described on the Advanced Robotics Lab website.

[21]Oda, Mitsushige. *JAXA's Space Robotics Road Map*. *JAXA?s Space Robotics Road Map*. Japan Space Exploration Agency. Web. 27 Oct. 2009.

Mitsushige Oda writes about the uses, obstacles and advantages of using robots for space exploration.

[22]"HRP-4C Robot Woman Is A Cybernetic Humanoid." *Technovelgy*. 16 Mar. 2009. Web. 05 Nov. 2009. <www.technovelgy.com>.

Reveals development and production costs for HRP-4C, a human robot initially designed to act as a fashion model.

[23]Ricker, Thomas. "Japan's HRP-4C 'fashion model robot' unveiled, already harassed." *Engadget*. AOL, 16 Mar. 2009. Web. 03 Nov. 2009. <http://www.engadget.com/2009/03/16/japans-hrp-4c-fashion-model-robot-unveiled-already-harassed/>.

Engadget discusses the HRP-4C fashion robot.

[24]"Saya, Japan's robot teacher, can smile and scold, but don't fire those substitutes yet." *NY Daily News*. 11 Mar. 2009. Web. 03 Dec. 2009. <http://www.nydailynews.com/news/national/2009/03/11/2009-03-11_saya_japans_robot_teacher_can_smile_and_-2.html>.

Professional optimism and skepticism are revealed in NY Daily News.

[25]"Japanese School Hires World's First Robot Teacher." *Robot World News*. 08 Mar. 2009. Web. 27 Nov. 2009. <http://www.robotworldnews.com/100668.html>.

Robot World News discusses the features and uses of Saya, an educational robot.

[26]Hornyak, Tim. "Mini robot can cruise through burning buildings." *CNET*. 07 Oct. 2009. Web. 18 Oct. 2009. <http://news.cnet.com/8301-17938_105-10369604-1.html>.

CNET discusses Hoya, a small robot used to obtain information about fires. It is intended scout buildings before firefighters enter, allowing them the chance to plan their strategy.

[27]Gilman, Victoria. "Photo in the News: Female Android Debuts in S. Korea." *National Geographic*. 15 May 2006. Web. 18 Oct. 2009. <http://news.nationalgeographic.com/news/2006/05/android-korea-1.html>.

This article addresses the robot EveR-1, a humanoid robot intended to be used as a substitute for people in jobs where tasks or questions are predictable.

[28]"IRobi reacts to voice commands." *Ubergizmo*. 07 Oct. 2009. Web. 18 Oct. 2009. <http://www.ubergizmo.com/15/archives/2009/10/irobi_reacts_to_voice_commands.html>.

Ubergizmo explains the uses and price tag of IRobi, a nanny and teacher robot.

[29] "Inventor unveils $7,000 talking sex robot." *CNN*. 01 Feb. 2010. Web. 08 Apr. 2010. <http://www.cnn.com/2010/TECH/02/01/sex.robot/index.html>.

[30]The Internet Movie Database (IMDb). Web. 27 Mar. 2010. <http://www.imdb.com/>.

[31]"Glimpses—The Uncanny Valley." Glimpses. Ed. Dave Bryant. Web. 27 Mar. 2010. <http://www.arclight.net/~pdb/nonfiction/uncanny-valley.html>.

[32]“Senior Care: How Much Does it Really Cost.” *caregiverlist*. 10 Jul. 2008. Web. 08 Apr. 2010. <http://www.caregiverlist.com/blog/julie/archive/2008/07/10/seniorcarecosts.aspx>

[33]“The Great Robot Race.” *PBS.org*. Web. 01 May. 2010.

< http://www.pbs.org/wgbh/nova/darpa>

[34]“Anybots Homepage” *Anybots*. Web. 01 May. 2010.

< http://anybot.com/>

[35]“Facebook Population Statistics” *CheckFacebook.com*. Web. 01 May. 2010.

< www.checkfacebook.com>

Appendix B – Institutional Review Board Exemption Form

100 Institute Road
Worcester, MA 01609-2280, USA
508-831-5000, Fax: 508-831-6090
www.wpi.edu

Worcester Polytechnic Institute IRB #1
IRB 00007374

17 February 2010
File:10-026

Worcester Polytechnic Institute
100 Institute Road
Worcester, MA 01609

Re: IRB Application for Exemption 10-026 "STATE-OF-THE-ART ROBOTICS TECH"

Dear Prof. Padir,

The WPI Institutional Review Committee (IRB) has reviewed the materials submitted in regards to the above mentioned study and has determined that this research is exempt from further IRB review and supervision under 45 CFR 46.101(b)(2): "Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation."

This exemption covers any research and data collected under your protocol from 17 February 2010 to 16 February 2011 unless terminated sooner (in writing) by yourself or the WPI IRB. Amendments or changes to the research that might alter this specific exemption must be submitted to the WPI IRB for review and may require a full IRB application in order for the research to continue.

Please contact the undersigned if you have any questions about the terms of this exemption.

Thank you for your cooperation with the WPI IRB.

Sincerely,

Kent Rissmiller
WPI IRB Chair

Appendix C – Primary Survey Results Minus Free Responses

gender?	age group.	What is your average yearly household income	school?	What is your highest completed level of education?	What is your occupational area?	In what type of residence do you currently reside?	How many robots does your household own?	What are the primary functions of the robots your household owns (if any)?	Vacuuming/Floor Cleaning Robot	Lawn Care	Cooking Robot	Robotic Pet	Educational/Tutor Robot	Personal/Elder Care Robot
Female	46-55	$120,000+	No	Bachelor's	Education	House	1.	Cleaning	$100 to $199	$200 to $299	$100 to $199	Up to $99	Up to $99	$200 to $299
Male	46-55	$120,000+	No	Don't wish to respond	Finance	House	1.	Cleaning	$200 to $299	$500 and up	$400 to $499	Up to $99	$400 to $499	$500 and up
Male	56-65	Don't wish to respond	Yes	Bachelor's	Managerial	House	0.		Up to $99	$400 to $499	$300 to $399	Up to $99	Up to $99	Up to $99
Male	26-35	$80,000 - $119,000	No	Master's	Education	House	0.		$300 to $399	$300 to $399	Up to $99	Up to $99	Up to $99	$500 and up
Male	46-55	Don't wish to respond	No	Don't wish to respond	Finance	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	56-65	$120,000+	No	Bachelor's	Finance	House	0.		Up to $99	$500 and up	Up to $99	Up to $99	$100 to $199	$500 and up
Female	46-55	$80,000 - $119,000	No	Bachelor's	Other	House	0.		$100 to $199	$100 to $199	$300 to $399	Up to $99	$200 to $299	$500 and up
Male	36-45	Don't wish to respond	No	Master's	Insurance	House	0.		$200 to $299	$500 and up	$400 to $499	Up to $99	Up to $99	$500 and up
Male	26-35	$120,000+	No	Don't wish to respond	Don't wish to respond	House	1.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	46-55	$50,000 - $79,000	No	Bachelor's	Insurance	House	0.		Up to $99	$300 to $399	Up to $99	Up to $99	Up to $99	Up to $99
Female	26-35	$50,000 - $79,000	Yes	Bachelor's	Insurance	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	$100 to $199	Up to $99
Female	17-25	$50,000 - $79,000	No	Bachelor's	Finance	House	0.		$100 to $199	$200 to $299	Up to $99	Up to $99	Up to $99	Up to $99
Female	46-55	$50,000 - $79,000	No	Associate's	Sales	House	0.		Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99	$200 to $299
Female	17-25	$80,000 - $119,000	No	Master's	Education	House	0.		$200 to $299	$300 to $399	$300 to $399	Up to $99	Up to $99	$300 to $399
Male	46-55	$120,000+	Yes	Bachelor's	Insurance	House	0.		$300 to $399	$500 and up	$200 to $299	Up to $99	Up to $99	Up to $99
Male	36-45	$120,000+	No	Doctorate	Insurance	House	0.		Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99
Female	46-55	Don't wish to respond	No	High School	Insurance	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	36-45	$80,000 - $119,000	Yes	High School	Managerial	House	0.		Up to $99	$500 and up	Up to $99	Up to $99	Up to $99	Up to $99
Female	26-35	$50,000 - $79,000	No	High School	Secretarial	House	0.		$100 to $199	$300 to $399	$300 to $399	$100 to $199	$100 to $199	$500 and up
Female	26-35	$80,000 - $119,000	No	Bachelor's	Managerial	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	36-45	$120,000+	No	High School	Technology	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	36-45	$120,000+	No	Bachelor's	Managerial	House	0.		$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99	$100 to $199
Male	26-35	$120,000+	No	Doctorate	Legal	Condominium	0.		Up to $99	$300 to $399	$300 to $399	Up to $99	Up to $99	Up to $99
Female	17-25	$30,000 - $49,000	No	Bachelor's	Don't wish to respond	House	0.	Cleaning, Entertainment, Lawn Care, Security	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	Associate's	Biotechnology	House	0.		Up to $99	$100 to $199	Up to $99	Up to $99	$200 to $299	$400 to $499
Female	17-25	Don't wish to respond	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$100 to $199
Male	17-25	Don't wish to respond	Yes	High School	Engineering	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Less than $10,000	Yes	High School	Engineering	Dormitory	0.		Up to $99	$200 to $299	$100 to $199	Up to $99	$100 to $199	$400 to $499
Female	17-25	Less than $10,000	Yes	High School	Student	Apartment	0.		Up to $99	Up to $99	Up to $99	$100 to $199	Up to $99	Up to $99
Female	17-25	$80,000 - $119,000	Yes	High School	Student	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$50,000 - $79,000	No	Bachelor's	Engineering	Apartment	0.		Up to $99	$200 to $299	$200 to $299	Up to $99	$100 to $199	$500 and up
Female	17-25	$80,000 - $119,000	Yes	High School	Student	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99

Male	17-25	Less than $10,000	No	High School	Student	Dormitory		0.		$100 to $199	$300 to $399	$100 to $199	Up to $99	Up to $99	$100 to $199
Male	17-25	Less than $10,000	Yes	High School	Student	House		0.		$100 to $199	$500 and up	$300 to $399	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	Yes	Middle School	Student	Apartment		0.		$100 to $199	$300 to $399	Up to $99	Up to $99	Up to $99	$300 to $399
Female	17-25	Don't wish to respond	Yes	High School	Engineering	Dormitory		5.	Cleaning, Entertainment, Security	Up to $99	Up to $99	$100 to $199	Up to $99	$100 to $199	$200 to $299
Female	17-25	$80,000 - $119,000	Yes	High School	Student	Dormitory		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$100 to $199
Male	17-25	Less than $10,000	Yes	High School	Engineering	Dormitory		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$100 to $199
Female	17-25	Less than $10,000	Yes	High School	Student	Apartment		0.		$100 to $199	$200 to $299	$100 to $199	Up to $99	$100 to $199	$200 to $299
Male	17-25	Less than $10,000	Yes	High School	Student	Dormitory		0.		$200 to $299	Up to $99	$500 and up	Up to $99	$300 to $399	$500 and up
Male	17-25	Less than $10,000	Yes	High School	Student	Apartment		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Less than $10,000	Yes	Bachelor's	Engineering	Apartment		0.		Up to $99	Up to $99	$500 and up	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Engineering	Dormitory		1.	Cleaning	$100 to $199	$400 to $499	Up to $99	Up to $99	Up to $99	$500 and up
Male	17-25	$120,000+	Yes	High School	Engineering	Dormitory		0.		$200 to $299	$400 to $499	$500 and up	Up to $99	$100 to $199	$500 and up
Female	Don't wish to respond	Don't wish to respond	No	Don't wish to respond	Don't wish to respond	Dormitory		0.	Cleaning	$500 and up	$500 and up	$500 and up	$500 and up	$500 and up	$500 and up
Male	17-25	$80,000 - $119,000	Yes	High School	Engineering	Dormitory		0.		Up to $99	$100 to $199	Up to $99	Up to $99	$100 to $199	$100 to $199
Male	17-25	Less than $10,000	Yes	High School	Engineering	Apartment		0.		Up to $99	$200 to $299	$300 to $399	Up to $99	$400 to $499	$500 and up
Male	17-25	$80,000 - $119,000	Yes	High School	Student	Apartment		1.	Cleaning	$100 to $199	$200 to $299	Up to $99	Up to $99	Up to $99	$500 and up
Male	17-25	Don't wish to respond	Yes	Bachelor's	Engineering	Dormitory		0.		Up to $99	Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory		0.		Up to $99	Up to $99	$200 to $299	$100 to $199	Up to $99	$400 to $499
Female	17-25	Don't wish to respond	No	High School	Engineering	Apartment		10+	Cleaning, Entertainment, Lawn Care	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$50,000 - $79,000	Yes	Associate's	Engineering	Condominium		1.	Cleaning	$200 to $299	$300 to $399	$100 to $199	Up to $99	$200 to $299	$200 to $299
Female	17-25	$80,000 - $119,000	Yes	High School	Student	Dormitory		0.		Up to $99	$200 to $299	$100 to $199	Up to $99	$100 to $199	$200 to $299
Male	17-25	Don't wish to respond	Yes	High School	Student	Apartment		0.		$100 to $199	Up to $99	$400 to $499	$200 to $299	$500 and up	$500 and up
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory		0.		$100 to $199	$300 to $399	$100 to $199	Up to $99	Up to $99	$500 and up
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory		0.		Up to $99	$100 to $199	$100 to $199	Up to $99	$300 to $399	$500 and up
Male	17-25	Less than $10,000	Yes	High School	Student	Dormitory		0.		Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Engineering	Dormitory		1.	Cleaning	Up to $99	$200 to $299	$500 and up	Up to $99	Up to $99	$500 and up
Female	17-25	Don't wish to respond	Yes	High School	Other	Dormitory		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Less than $10,000	Yes	High School	Technology	Apartment		0.		$100 to $199	$100 to $199	Up to $99	Up to $99	Up to $99	$300 to $399
Female	17-25	Don't wish to respond	Yes	High School	Student	Apartment		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	$120,000+	Yes	High School	Engineering	Apartment		0.		Up to $99	Up to $99	$100 to $199	Up to $99	Up to $99	$200 to $299
Female	17-25	$10,000 - $29,999	Yes	High School	Student	Dormitory		0.		Up to $99	$200 to $299	Up to $99	Up to $99	$300 to $399	$500 and up
Female	17-25	Less than $10,000	Yes	High School	Student	House		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	Yes	High School	Engineering	Apartment		1.	Cleaning	Up to $99	$100 to $199	Up to $99	Up to $99	$100 to $199	$200 to $299
Female	17-25	Don't wish to respond	Yes	High School	Student	Apartment		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$120,000+	Yes	High School	Engineering	Dormitory		0.		Up to $99	$300 to $399	$300 to $399	Up to $99	$100 to $199	$500 and up
Male	17-25	$30,000 - $49,000	Yes	High School	Student	Dormitory		0.		Up to $99	$100 to $199	$100 to $199	$100 to $199	$200 to $299	$200 to $299

Female	17-25	$30,000 - $49,000	Yes	High School	Student	Dormitory	0.		Up to $99	$100 to $199	$200 to $299	$200 to $299	$200 to $299	$300 to $399
Male	17-25	Don't wish to respond	Yes	Don't wish to respond	Don't wish to respond	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	Yes	High School	Animal Care	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Engineering	Dormitory	0.		Up to $99	$200 to $299	$100 to $199	Up to $99	Up to $99	$200 to $299
Male	17-25	$120,000+	Yes	High School	Student	Dormitory	0.		$100 to $199	$300 to $399	$400 to $499	Up to $99	$500 and up	$500 and up
Female	17-25	Don't wish to respond	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99
Female	17-25	$80,000 - $119,000	Yes	High School	Student	House	1.	Entertainment	Up to $99	Up to $99	$100 to $199	$200 to $299	$100 to $199	$300 to $399
Male	17-25	$50,000 - $79,000	Yes	High School	Engineering	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$200 to $299
Male	17-25	Less than $10,000	Yes	High School	Don't wish to respond	Dormitory	0.		Up to $99	$100 to $199	$500 and up	Up to $99	Up to $99	Up to $99
Male	17-25	Less than $10,000	Yes	High School	Student	Dormitory	2.	Entertainment	Up to $99	$100 to $199	$200 to $299	Up to $99	$200 to $299	$400 to $499
Female	17-25	$10,000 - $29,999	Yes	High School	Student	House	2.	Cleaning	Up to $99	$200 to $299	$100 to $199	Up to $99	$100 to $199	$400 to $499
Female	17-25	$10,000 - $29,999	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Don't wish to respond	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Don't wish to respond	Dormitory	1.	Kill John Connor	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	Don't wish to respond	Student	Apartment	0.		Up to $99	Up to $99	$100 to $199	Up to $99	$100 to $199	$200 to $299
Male	17-25	Less than $10,000	Yes	High School	Student	Apartment	0.		$100 to $199	$100 to $199	$100 to $199	$300 to $399	$100 to $199	$400 to $499
Male	17-25	Don't wish to respond	Yes	High School	Student	Apartment	1.	Entertainment	$100 to $199	$100 to $199	$100 to $199	$500 and up	$100 to $199	$500 and up
Female	17-25	$120,000+	Yes	High School	Student	Apartment	5.	Cleaning, Entertainment	Up to $99	$400 to $499	$400 to $499	Up to $99	$400 to $499	$500 and up
Male	17-25	$10,000 - $29,999	Yes	Associate's	Managerial	Apartment	0.		$100 to $199	$100 to $199	$200 to $299	$100 to $199	Up to $99	$100 to $199
Male	17-25	Less than $10,000	Yes	High School	Other	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Less than $10,000	Yes	High School	Programming	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$500 and up
Male	17-25	Don't wish to respond	Yes	High School	Programming	Apartment	0.		$100 to $199	$300 to $399	$200 to $299	Up to $99	Up to $99	$500 and up
Female	17-25	Don't wish to respond	Yes	High School	Health	Dormitory	1.	Entertainment	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$200 to $299
Male	17-25	$120,000+	Yes	Bachelor's	Student	Apartment	1.	Entertainment	Up to $99	$200 to $299	Up to $99	Up to $99	$500 and up	$100 to $199
Female	66+	$120,000+	No	Middle School	Managerial	Dormitory	10+	Anal Pleasure/Private Security Force	$200 to $299	$300 to $399	$500 and up	Up to $99	$100 to $199	$500 and up
Male	17-25	Less than $10,000	Yes	High School	Student	Dormitory	1.	Cleaning	Up to $99	Up to $99	Up to $99	Up to $99	$100 to $199	$300 to $399
Male	Don't wish to respond	Don't wish to respond	Yes	High School	Engineering	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	$100 to $199	Up to $99
Male	17-25	$50,000 - $79,000	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	$120,000+	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Less than $10,000	Yes	Bachelor's	Engineering	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$100 to $199
Female	17-25	$10,000 - $29,999	Yes	Bachelor's	Engineering	Apartment	0.		$100 to $199	$400 to $499	$300 to $399	Up to $99	Up to $99	$100 to $199
Female	17-25	Less than $10,000	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	Associate's	Entertainment	Apartment	0.		Up to $99	$100 to $199	$100 to $199	$200 to $299	$200 to $299	$300 to $399
Male	17-25	Don't wish to respond	Yes	High School	Engineering	Dormitory	0.		$100 to $199	$200 to $299	$300 to $399	$100 to $199	$300 to $399	$300 to $399
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory	0.		$100 to $199	$200 to $299	Up to $99	$100 to $199	$300 to $399	$500 and up
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory	0.		$100 to $199	$100 to $199	$200 to $299	Up to $99	Up to $99	$300 to $399
Female	17-25	Less than $10,000	Yes	High School	Managerial	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$100 to $199

									this survey should specify what a robot is such as 1 : a machine that looks like a human being and performs various complex acts (as walking or talking) of a human being 2 : a device that automatically performs complicated often repetitive tasks 3 : a mechanism guided by automatic controls						
Male	17-25	Less than $10,000	Yes	High School	Engineering	Apartment		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$200 to $299
Female	17-25	Don't wish to respond	Yes	High School	Biotechnology	Dormitory		0.		$100 to $199	$300 to $399	$200 to $299	Up to $99	$200 to $299	$500 and up
Female	17-25	Don't wish to respond	No	High School	Student	Dormitory		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Student	House		0.		Up to $99	$200 to $299	$100 to $199	Up to $99	$200 to $299	$100 to $199
Female	17-25	Don't wish to respond	Yes	High School	Student	Dormitory		0.		$100 to $199	$200 to $299	Up to $99	Up to $99	$100 to $199	$200 to $299
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$80,000 - $119,000	Yes	High School	Student	Dormitory		0.		Up to $99	Up to $99	$200 to $299	$200 to $299	$400 to $499	$400 to $499
Male	17-25	Less than $10,000	Yes	Associate's	Student	Apartment		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$120,000+	Yes	High School	Engineering	Apartment		0.		$100 to $199	$100 to $199	$300 to $399	Up to $99	$300 to $399	$500 and up
Female	17-25	$30,000 - $49,000	Yes	Associate's	Engineering	Apartment		0.		Up to $99	Up to $99	$100 to $199	Up to $99	$100 to $199	$200 to $299
Female	17-25	Don't wish to respond	Yes	High School	Student	Dormitory		2.	Entertainment, Educational Toys	$100 to $199	Up to $99	Up to $99	Up to $99	$100 to $199	$100 to $199
Male	17-25	Don't wish to respond	Yes	High School	Engineering	Dormitory		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	Yes	High School	Other	Apartment	10+		Entertainment	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	Yes	High School	Student	Dormitory		0.		$100 to $199	$200 to $299	Up to $99	$200 to $299	$200 to $299	$300 to $399
Male	17-25	Don't wish to respond	No	High School	Biotechnology	Apartment		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Less than $10,000	No	High School	Engineering	Dormitory		0.		$200 to $299	Up to $99	Up to $99	Up to $99	$100 to $199	$400 to $499
Male	17-25	Less than $10,000	Yes	Bachelor's	Student	Apartment		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Student	Apartment		0.		Up to $99	Up to $99	$100 to $199	Up to $99	$100 to $199	$100 to $199
Female	17-25	Don't wish to respond	Yes	High School	Student	Dormitory		2.	Cleaning	$100 to $199	$200 to $299	$200 to $299	Up to $99	$100 to $199	$200 to $299
Male	17-25	Don't wish to respond	Yes	High School	Don't wish to respond	Dormitory		0.		Up to $99	$100 to $199	Up to $99	Up to $99	$100 to $199	$100 to $199
Male	17-25	Less than $10,000	Yes	High School	Student	House		1.	Cleaning	Up to $99	Up to $99	$100 to $199	Up to $99	$200 to $299	$200 to $299
Male	17-25	Don't wish to respond	Yes	Don't wish to respond	Engineering	Apartment		0.		Up to $99	$100 to $199	$100 to $199	Up to $99	$100 to $199	$300 to $399
Female	17-25	Don't wish to respond	Yes	Bachelor's	Biotechnology	Apartment		0.		Up to $99	$100 to $199	$100 to $199	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	Yes	High School	Engineering	Apartment		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	Yes	High School	Engineering	Dormitory		1.	Entertainment	Up to $99	$100 to $199	$100 to $199	Up to $99	Up to $99	$200 to $299
Male	17-25	$80,000 - $119,000	Yes	High School	Student	Apartment		0.		$200 to $299	$200 to $299	Up to $99	$200 to $299	$100 to $199	$300 to $399
Male	17-25	Don't wish to respond	Yes	High School	Engineering	Apartment		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Less than $10,000	Yes	Bachelor's	Student	Dormitory		0.		Up to $99	Up to $99	$100 to $199	Up to $99	$200 to $299	$500 and up
Male	17-25	Less than $10,000	Yes	High School	Student	Dormitory		0.		$100 to $199	$100 to $199	$100 to $199	Up to $99	$500 and up	$500 and up
Female	17-25	Less than $10,000	Yes	High School	Engineering	Dormitory		1.	Cleaning	$100 to $199	$200 to $299	Up to $99	Up to $99	Up to $99	Up to $99

Female	17-25	Less than $10,000	Yes	High School	Student	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory	0.		$200 to $299	Up to $99	$300 to $399	$100 to $199	$400 to $499	$300 to $399
Male	17-25	Less than $10,000	Yes	High School	Student	Apartment	0.		$100 to $199	$300 to $399	$100 to $199	Up to $99	$300 to $399	$500 and up
Female	17-25	$50,000 - $79,000	Yes	Bachelor's	Engineering	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Engineering	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	26-35	$10,000 - $29,999	Yes	Bachelor's	Student	Apartment	0.		Up to $99	$100 to $199	$100 to $199	Up to $99	Up to $99	$500 and up
Male	46-55	$120,000+	Yes	Associate's	Technology	House	0.		$100 to $199	$200 to $299	$300 to $399	Up to $99	$300 to $399	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory	0.		$100 to $199	$100 to $199	$300 to $399	Up to $99	$200 to $299	$100 to $199
Female	17-25	Don't wish to respond	Yes	Don't wish to respond	Engineering	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$50,000 - $79,000	Yes	Bachelor's	Health		0.	Cleaning, Security	$100 to $199	$200 to $299	$500 and up	Up to $99	$500 and up	$500 and up
Female	17-25	Don't wish to respond	Yes	Bachelor's	Student	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory	1.	Cleaning	Up to $99	$100 to $199	$200 to $299	Up to $99	$100 to $199	$200 to $299
Male	17-25	Don't wish to respond	Yes	High School	Student	Apartment	0.		Up to $99	$200 to $299	$100 to $199	Up to $99	$200 to $299	$300 to $399
Female	66+	$120,000+	No	No Formal Education	Animal Care	Condominium	5.	sexual companionship	$300 to $399	$400 to $499	$400 to $499	$500 and up	$500 and up	$500 and up
Male	17-25	Don't wish to respond	Yes	High School	Student	Apartment	1.	Cleaning	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$50,000 - $79,000	Yes	High School	Biotechnology	Apartment	0.		$100 to $199	$300 to $399	Up to $99	Up to $99	Up to $99	$400 to $499
Male	17-25	Less than $10,000	Yes	High School	Student	Apartment	0.		$100 to $199	$300 to $399	Up to $99	Up to $99	$100 to $199	$400 to $499
Male	17-25	$50,000 - $79,000	Yes	Bachelor's	Engineering	Apartment	0.		Up to $99	$500 and up	Up to $99	Up to $99	Up to $99	Up to $99
Male	Don't wish to respond	$30,000 - $49,000	Yes	High School	Student	Apartment	0.		Up to $99	$500 and up	$200 to $299	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Don't wish to respond	Dormitory	0.		Up to $99	Up to $99	$500 and up	Up to $99	Up to $99	$500 and up
Female	17-25	Don't wish to respond	Yes	High School	Student	Dormitory	0.		Up to $99	$100 to $199	Up to $99	Up to $99	$100 to $199	$500 and up
Male	17-25	$120,000+	No	High School	Engineering	Dormitory	0.		Up to $99	$500 and up	$300 to $399	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	No	High School	Student	House	0.		Up to $99	Up to $99	Up to $99	$200 to $299	$200 to $299	$500 and up
Male	17-25	Less than $10,000	Yes	Bachelor's	Engineering	Apartment	0.		$100 to $199	$200 to $299	$200 to $299	Up to $99	$200 to $299	$400 to $499
Male	17-25	Less than $10,000	Yes	High School	Student	Dormitory	0.		$100 to $199	$300 to $399	$200 to $299	Up to $99	$400 to $499	$200 to $299
Female	17-25	$10,000 - $29,999	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	$200 to $299	Up to $99	$100 to $199	$200 to $299
Female	17-25	Less than $10,000	Yes	High School	Student	Apartment	0.		Up to $99	$100 to $199	Up to $99	Up to $99	$400 to $499	$500 and up
Female	17-25	$50,000 - $79,000	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$30,000 - $49,000	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	$200 to $299	$300 to $399
Male	17-25	$80,000 - $119,000	Yes	High School	Engineering	Dormitory	0.		$100 to $199	$200 to $299	$100 to $199	Up to $99	Up to $99	$300 to $399
Male	17-25	$10,000 - $29,999	Yes	Associate's	Engineering	Apartment	1.		Up to $99	$100 to $199	$200 to $299	Up to $99	Up to $99	$300 to $399
Male	17-25	$80,000 - $119,000	Yes	High School	Service	Dormitory	0.		Up to $99	$500 and up	$100 to $199	Up to $99	Up to $99	$500 and up
Female	17-25	Less than $10,000	Yes	Bachelor's	Engineering	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Less than $10,000	Yes	High School	Student	Apartment	1.	Cleaning	Up to $99	$100 to $199	$100 to $199	$100 to $199	$300 to $399	$500 and up
Male	17-25	Less than $10,000	Yes	High School	Student	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory	5.	Entertainment	$100 to $199	$400 to $499	Up to $99	$100 to $199	$300 to $399	$500 and up

Female	46-55	Less than $10,000	Yes	High School	Programming	Apartment		0.		Up to $99	$200 to $299	$100 to $199	Up to $99	Up to $99	$500 and up
Male	17-25	$30,000 - $49,000	Yes	High School	Engineering	Apartment		0.	Security	$100 to $199	$300 to $399	$100 to $199	Up to $99	$100 to $199	$400 to $499
Male	17-25	Don't wish to respond	Yes	High School	Engineering	Apartment		0.		Up to $99	$100 to $199	$200 to $299	Up to $99	Up to $99	$300 to $399
Female	17-25	Don't wish to respond	Yes	High School	Student	House		1.	Cleaning	Up to $99	$100 to $199	$100 to $199	$100 to $199	$100 to $199	Up to $99
Male	17-25	Less than $10,000	Yes	High School	Student	Apartment		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	Yes	Bachelor's	Student	Apartment		2.	Cleaning	$100 to $199	Up to $99	Up to $99	Up to $99	$100 to $199	Up to $99
Female	17-25	Don't wish to respond	Yes	Don't wish to respond	Don't wish to respond	Apartment		0.		$100 to $199	$200 to $299	Up to $99	Up to $99	$400 to $499	$500 and up
Female	17-25	Less than $10,000	Yes	High School	Student	Apartment		0.		$100 to $199	$100 to $199	$200 to $299	Up to $99	$200 to $299	Up to $99
Male	17-25	$120,000+	Yes	High School	Finance	Dormitory		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Less than $10,000	Yes	High School	Programming	Apartment		0.		$100 to $199	$500 and up	$100 to $199	Up to $99	$100 to $199	$500 and up
Male	17-25	Less than $10,000	Yes	High School	Engineering	Apartment		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Engineering	Dormitory		1.	Cleaning	Up to $99	Up to $99	Up to $99	Up to $99	$200 to $299	$500 and up
Male	17-25	Less than $10,000	Yes	High School	Student	Apartment		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$500 and up
Female	17-25	Don't wish to respond	Yes	High School	Engineering	Apartment		0.		Up to $99	$100 to $199	Up to $99	Up to $99	$200 to $299	$300 to $399
Male	17-25	Don't wish to respond	Yes	Bachelor's	Student	Apartment		0.		$100 to $199	$100 to $199	$200 to $299	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Engineering	Dormitory		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$80,000 - $119,000	Yes	High School	Student	Dormitory		0.		$100 to $199	$300 to $399	$200 to $299	Up to $99	Up to $99	$500 and up
Male	17-25	Don't wish to respond	Yes	High School	Student	Apartment	10+		Entertainment, various electronics projects, toys	$100 to $199	$300 to $399	$500 and up	Up to $99	$300 to $399	$500 and up
Female	17-25	$10,000 - $29,999	Yes	High School	Student	Dormitory		0.		Up to $99	Up to $99	$200 to $299	$200 to $299	Up to $99	$300 to $399
Male	17-25	Don't wish to respond	Yes	High School	Don't wish to respond	Dormitory		1.	robotics kits, and things with robotic functions	$100 to $199	$300 to $399	$500 and up	Up to $99	Up to $99	$100 to $199
Male	17-25	$10,000 - $29,999	Yes	High School	Service	House		0.		$400 to $499	$500 and up	Up to $99	$100 to $199	$100 to $199	$200 to $299
Male	17-25	$50,000 - $79,000	Yes	High School	Engineering	Apartment		1.	Cleaning	$100 to $199	$100 to $199	$300 to $399	Up to $99	Up to $99	$500 and up
Male	17-25	Less than $10,000	Yes	High School	Engineering	Apartment		1.	Entertainment	Up to $99	$200 to $299	$500 and up	Up to $99	$200 to $299	$500 and up
Male	56-65	Don't wish to respond	No	Master's	Don't wish to respond	House		0.		$200 to $299	Up to $99	Up to $99	Up to $99	$300 to $399	$400 to $499
Female	46-55	$80,000 - $119,000	No	Associate's	Education	House		1.	Cleaning	$200 to $299	$500 and up	$100 to $199	Up to $99	$200 to $299	$400 to $499
Female	17-25	Don't wish to respond	No	High School	Engineering	Apartment		0.		Up to $99	$100 to $199	$100 to $199	Up to $99	$100 to $199	$300 to $399
Male	17-25	Less than $10,000	Yes	High School	Don't wish to respond	Dormitory		0.		Up to $99	$300 to $399	$300 to $399	Up to $99	Up to $99	$500 and up
Male	46-55	$80,000 - $119,000	No	Bachelor's	Sales	House		0.		$100 to $199	$200 to $299	Up to $99	Up to $99	Up to $99	$200 to $299
Male	17-25	$120,000+	Yes	High School	Engineering	Apartment		2.	Cleaning	$100 to $199	$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory		0.		Up to $99	Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99
Male	46-55	$80,000 - $119,000	No	Master's	Managerial	House		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	26-35	$50,000 - $79,000	No	Bachelor's	Technology	House		3.	Cleaning, Entertainment	$100 to $199	$100 to $199	$100 to $199	$200 to $299	$100 to $199	$300 to $399
Male	46-55	$120,000+	No	Doctorate	Education	House		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	46-55	$50,000 - $79,000	No	Master's	Managerial	House		0.		$100 to $199	Up to $99	Up to $99	Up to $99	$100 to $199	$200 to $299
Female	46-55	$30,000 - $49,000	No	Master's	Education	Apartment		0.		$100 to $199	$100 to $199	$500 and up	Up to $99	$500 and up	$500 and up
Male	46-55	$120,000+	No	Doctorate	Education	House		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	36-45	$30,000 - $49,000	No	Bachelor's	Secretarial	House		0.		Up to $99	Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99

Female	56-65	Don't wish to respond	No	Associate's	Secretarial	Condominium	0.		Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Less than $10,000	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$200 to $299
Female	46-55	$120,000+	No	Master's	Finance	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	56-65	$120,000+	No	Master's	Managerial	House	0.		$100 to $199	$500 and up	Up to $99	Up to $99	$100 to $199	$500 and up
Female	26-35	$80,000 - $119,000	No	Bachelor's	Education	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	26-35	$10,000 - $29,999	Yes	Associate's	Engineering	Apartment	0.		$100 to $199	$100 to $199	Up to $99	Up to $99	Up to $99	$500 and up
Female	56-65	Don't wish to respond	No	High School	Secretarial	House	0.		$100 to $199	$300 to $399	Up to $99	Up to $99	Up to $99	$300 to $399
Male	46-55	$120,000+	No	Master's	Education	House	1.	Cleaning	$100 to $199	$300 to $399	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Less than $10,000	Yes	Don't wish to respond	Don't wish to respond	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$500 and up
Female	26-35	Don't wish to respond	No	Master's	Secretarial	House	0.		$100 to $199	Up to $99	$200 to $299	Up to $99	$100 to $199	$500 and up
Female	36-45	$80,000 - $119,000	No	Bachelor's	Technology	House	0.		Up to $99	$300 to $399	Up to $99	Up to $99	$100 to $199	$500 and up
Male	56-65	$50,000 - $79,000	Yes	Associate's	Technology	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	26-35	$120,000+	Yes	Master's	Technology	House	2.	Cleaning	$100 to $199	$100 to $199	Up to $99	Up to $99	$200 to $299	$200 to $299
Female	26-35	$50,000 - $79,000	No	Master's	Other	Apartment	0.		Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99	$100 to $199
Female	46-55	$30,000 - $49,000	No	Bachelor's	Technology	Apartment	0.		$200 to $299	$300 to $399	$300 to $399	Up to $99	Up to $99	$200 to $299
Male	56-65	$50,000 - $79,000	No	Associate's	Other	House	0.		Up to $99	$500 and up	$300 to $399	Up to $99	Up to $99	$500 and up
Male	56-65	$120,000+	Yes	Doctorate	Education	House	0.		Up to $99	$200 to $299	Up to $99	Up to $99	Up to $99	$400 to $499
Female	56-65	$50,000 - $79,000	No	Master's	Education	House	0.	Entertainment, pool cleaning	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	56-65	Don't wish to respond	No	Doctorate	Engineering	House	0.		$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	36-45	$80,000 - $119,000	No	Master's	Education	House	0.		$100 to $199	$500 and up	$500 and up	Up to $99	Up to $99	$500 and up
Female	56-65	$80,000 - $119,000	No	High School	Graphics	House	0.		$100 to $199	$100 to $199	Up to $99	Up to $99	Up to $99	$100 to $199
Female	36-45	$120,000+	No	Bachelor's	Sales	Condominium	0.		Up to $99	Up to $99	$100 to $199	Up to $99	Up to $99	$500 and up
Female	46-55	$80,000 - $119,000	No	Bachelor's	Biotechnology	House	1.	Cleaning	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	56-65	$50,000 - $79,000	No	Master's	Education	House	0.		$100 to $199	$500 and up	$100 to $199	Up to $99	Up to $99	$500 and up
Female	26-35	$120,000+	No	Doctorate	Don't wish to respond	Apartment	0.		Up to $99	Up to $99	$100 to $199	Up to $99	Up to $99	$400 to $499
Male	56-65	$120,000+	No	Master's	Engineering	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$10,000 - $29,999	Yes	Associate's	Engineering	House	0.		$300 to $399	$500 and up	Up to $99	Up to $99	Up to $99	$500 and up
Male	17-25	$80,000 - $119,000	Yes	High School	Engineering	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	26-35	$30,000 - $49,000	No	Master's	Education	Condominium	0.		Up to $99	Up to $99	$200 to $299	$100 to $199	Up to $99	Up to $99
Female	46-55	Don't wish to respond	No	Bachelor's	Education	House	0.		$100 to $199	$200 to $299	Up to $99	Up to $99	$100 to $199	Up to $99
Female	17-25	Don't wish to respond	Yes	High School	Health	Dormitory	0.		Up to $99	Up to $99	$100 to $199	Up to $99	Up to $99	$200 to $299
Male	17-25	Don't wish to respond	Yes	High School	Student	House	0.		Up to $99	Up to $99	$200 to $299	Up to $99	$100 to $199	Up to $99
Female	36-45	$80,000 - $119,000	No	High School	Secretarial	House	0.		Up to $99	$200 to $299	$300 to $399	Up to $99	Up to $99	Up to $99
Female	26-35	$80,000 - $119,000	No	Master's	Education	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	26-35	$50,000 - $79,000	No	Master's	Education	Condominium	0.		Up to $99	$100 to $199	$100 to $199	Up to $99	Up to $99	$100 to $199
Female	26-35	$50,000 - $79,000	No	Doctorate	Education	House	0.		$100 to $199	$200 to $299	Up to $99	Up to $99	Up to $99	$100 to $199
Male	46-55	$30,000 - $49,000	No	High School	Service		0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	46-55	$120,000+	No	Associate's	Secretarial	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99

Male	46-55	$120,000+	No	Bachelor's	Other	House	1.	Cleaning	$100 to $199	$200 to $299	$100 to $199	Up to $99	$100 to $199	$500 and up
Female	46-55	$120,000+	No	Doctorate	Education	House	0.		Up to $99	Up to $99	$500 and up	Up to $99	Up to $99	Up to $99
Female	36-45	$80,000 - $119,000	No	Master's	Education	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$100 to $199
Male	17-25	Less than $10,000	Yes	Associate's	Student	House	0.		Up to $99	$300 to $399	$400 to $499	Up to $99	$200 to $299	$500 and up
Female	56-65	Don't wish to respond	No	Don't wish to respond	Don't wish to respond	House	0.		$100 to $199	$300 to $399	$500 and up	Up to $99	$500 and up	$500 and up
Female	46-55	Don't wish to respond	No	Bachelor's	Secretarial	House	0.		Up to $99	$400 to $499	Up to $99	Up to $99	Up to $99	$500 and up
Female	56-65	$120,000+	No	Bachelor's	Education	House	1.		$100 to $199	$200 to $299	Up to $99	Up to $99	Up to $99	$400 to $499
Female	36-45	$50,000 - $79,000	No	Master's	Managerial	House	0.		Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99
Male	26-35	$120,000+	No	Doctorate	Education	House	1.	Cleaning	$200 to $299	$500 and up	$200 to $299	Up to $99	Up to $99	Up to $99
Male	17-25	$80,000 - $119,000	Yes	High School	Student	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	56-65	Don't wish to respond	No	Doctorate	Education	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$80,000 - $119,000	Yes	High School	Student	Dormitory	2.	Cleaning	$100 to $199	$200 to $299	$100 to $199	Up to $99	$100 to $199	$300 to $399
Male	17-25	Don't wish to respond	Yes	Associate's	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$120,000+	Yes	Associate's	Student	Dormitory	0.		Up to $99	$100 to $199	$200 to $299	Up to $99	Up to $99	$500 and up
Female	26-35	$30,000 - $49,000	No	Master's	Service	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Less than $10,000	Yes	High School	Student	House	1.	Cleaning	$300 to $399	$200 to $299	$100 to $199	$200 to $299	$300 to $399	$200 to $299
Male	17-25	$30,000 - $49,000	Yes	Bachelor's	Engineering	Apartment	0.		Up to $99	$200 to $299	$200 to $299	$100 to $199	Up to $99	$500 and up
Female	46-55	$30,000 - $49,000	No	High School	Secretarial	House	0.		$100 to $199	$400 to $499	$100 to $199	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	No	High School	Programming	Apartment	0.		$100 to $199	$300 to $399	Up to $99	Up to $99	$100 to $199	$300 to $399
Female	36-45	$120,000+	No	Bachelor's	Other	Apartment	0.		$200 to $299	$500 and up	Up to $99	Up to $99	$100 to $199	$500 and up
Female	46-55	$50,000 - $79,000	No	Bachelor's	Secretarial	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$400 to $499
Male	17-25	Don't wish to respond	Yes	High School	Engineering	House	2.	Cleaning	$200 to $299	Up to $99	$100 to $199	Up to $99	$100 to $199	$200 to $299
Male	36-45	Don't wish to respond	No	Associate's	Technology	House	0.		Up to $99	$200 to $299	Up to $99	Up to $99	Up to $99	Up to $99
Female	26-35	$30,000 - $49,000	No	Master's	Managerial	Apartment	1.	Cleaning	$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99	$500 and up
Male	17-25	Don't wish to respond	Yes	High School	Student	House	2.	Cleaning, Entertainment	$100 to $199	$300 to $399	$200 to $299	Up to $99	$400 to $499	$500 and up
Male	17-25	$30,000 - $49,000	No	Don't wish to respond	Engineering	Apartment	2.	Entertainment	$100 to $199	$400 to $499	$300 to $399	Up to $99	$200 to $299	$400 to $499
Male	17-25	$50,000 - $79,000	Yes	High School	Programming	Apartment	0.		$100 to $199	$100 to $199	$200 to $299	Up to $99	Up to $99	$500 and up
Female	17-25	$120,000+	Yes	High School	Student	House	0.		$100 to $199	$200 to $299	Up to $99	Up to $99	Up to $99	$300 to $399
Male	46-55	Don't wish to respond	No	Master's	Managerial	House	0.		Up to $99	$200 to $299	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	Yes	High School	Engineering	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	26-35	Don't wish to respond	No	Doctorate	Don't wish to respond	House	1.	Entertainment	$100 to $199	$300 to $399	$100 to $199	$100 to $199	$100 to $199	$500 and up
Male	17-25	$30,000 - $49,000	Yes	High School	Student	Dormitory	0.		$100 to $199	$400 to $499	$500 and up	$500 and up	$500 and up	$500 and up
Male	17-25	Less than $10,000	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$100 to $199
Female	17-25	Don't wish to respond	Yes	High School	Health	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Less than $10,000	Yes	High School	Student	Apartment	0.		Up to $99	Up to $99	$100 to $199	$100 to $199	Up to $99	Up to $99
Male	17-25	$50,000 - $79,000	Yes	High School	Student	House	0.		$100 to $199	$200 to $299	$100 to $199	Up to $99	$300 to $399	$300 to $399
Female	26-35	$50,000 - $79,000	No	Associate's	Technology	Apartment	0.		$100 to $199	$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99
Female	36-45	$50,000 - $79,000	No	Bachelor's	Sales	Condominium	1.	Cleaning	$100 to $199	Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99

Female	36-45	$120,000+	No	Bachelor's	Other	House	0.		Up to $99	$400 to $499	Up to $99	Up to $99	Up to $99	Up to $99
Female	36-45	$30,000 - $49,000	No	Associate's	Other	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	$120,000+	Yes	High School	Engineering	Apartment	1.	Cleaning	$200 to $299	$300 to $399	$200 to $299	Up to $99	Up to $99	$500 and up
Female	Don't wish to respond	Less than $10,000	Yes	High School	Don't wish to respond	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	36-45	$30,000 - $49,000	No	High School	Don't wish to respond	House	0.		$200 to $299	$500 and up	$100 to $199	$500 and up	$200 to $299	$500 and up
Female	17-25	Don't wish to respond	Yes	High School	Engineering	Dormitory	0.		Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99	$100 to $199
Female	46-55	Don't wish to respond	No	Master's	Health	House	0.		$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99	$100 to $199
Male	17-25	$80,000 - $119,000	Yes	High School	Engineering	Dormitory	1.	Cleaning	Up to $99	Up to $99	$300 to $399	Up to $99	$500 and up	$500 and up
Female	17-25	Less than $10,000	Yes	High School	Engineering	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Student	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	Yes	High School	Student	Apartment	0.		Up to $99	$100 to $199	$200 to $299	$100 to $199	Up to $99	$300 to $399
Female	36-45	$120,000+	No	Doctorate	Legal	House	0.		$200 to $299	Up to $99	Up to $99	Up to $99	$500 and up	Up to $99
Male	17-25	Less than $10,000	Yes	High School	Student	Dormitory	0.		$100 to $199	$100 to $199	$500 and up	Up to $99	$200 to $299	$500 and up
Male	36-45	$80,000 - $119,000	No	Bachelor's	Engineering	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	56-65	$30,000 - $49,000	No	Associate's	Other	Condominium	0.		$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$120,000+	Yes	Bachelor's	Engineering	House	1.	Security, Assault	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	46-55	Don't wish to respond	No	Don't wish to respond	Education	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$500 and up
Male	17-25	$10,000 - $29,999	Yes	High School	Student	Apartment	0.	Entertainment	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	Yes	High School	Education	Dormitory	4.	Cleaning, Entertainment robots made for school	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$80,000 - $119,000	No	High School	Engineering	House	2.		$100 to $199	$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99
Female	66+	Don't wish to respond	No	High School	Health	Condominium	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	46-55	$30,000 - $49,000	No	Bachelor's	Finance	Condominium	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	Don't wish to respond	Don't wish to respond	No	Doctorate	Education	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Less than $10,000	Yes	High School	Student	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$10,000 - $29,999	Yes	High School	Engineering	Dormitory	1.	Cleaning	$200 to $299	$300 to $399	$300 to $399	Up to $99	$100 to $199	$300 to $399
Male	17-25	$120,000+	Yes	High School	Student	Dormitory	1.	Entertainment	$100 to $199	Up to $99	Up to $99	Up to $99	$200 to $299	$500 and up
Female	17-25	$120,000+	Yes	High School	Student	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	26-35	$50,000 - $79,000	No	Doctorate	Education	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Less than $10,000	No	High School	Engineering	Apartment	0.		$100 to $199	$100 to $199	$100 to $199	$100 to $199	$100 to $199	$100 to $199
Male	17-25	Less than $10,000	Yes	High School	Programming	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	46-55	$120,000+	No	Doctorate	Other	House	1.	Entertainment	$100 to $199	$100 to $199	Up to $99	Up to $99	Up to $99	$200 to $299
Male	17-25	Less than $10,000	Yes	High School	Student	House	2.	Entertainment, Robot Kits, Build Robots	$100 to $199	$200 to $299	Up to $99	Up to $99	$100 to $199	$300 to $399
Female	36-45	$80,000 - $119,000	No	Bachelor's	Other	House	0.		$100 to $199	$400 to $499	Up to $99	Up to $99	Up to $99	Up to $99
Female	36-45	$50,000 - $79,000	No	High School	Managerial	House	0.		Up to $99	$200 to $299	$200 to $299	Up to $99	Up to $99	$500 and up
Male	36-45	$50,000 - $79,000	No	High School	Other	House	0.		Up to $99	$300 to $399	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	Yes	Bachelor's	Biotechnology	Dormitory	0.		$100 to $199	$200 to $299	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Engineering	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	$100 to $199	$200 to $299

Male	17-25	Don't wish to respond	Yes	High School	Don't wish to respond	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Less than $10,000	Yes	High School	Health	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Don't wish to respond	Yes	Middle School	Student	House	0.		$100 to $199	$100 to $199	$100 to $199	Up to $99	Up to $99	Up to $99
Male	17-25	$120,000+	Yes	High School	Student	Dormitory	0.		$100 to $199	$100 to $199	$100 to $199	Up to $99	$300 to $399	$500 and up
Male	56-65	Don't wish to respond	No	Doctorate	Education	Condominium	0.		Up to $99	Up to $99	$200 to $299	Up to $99	$100 to $199	$400 to $499
Female	17-25	$30,000 - $49,000	Yes	Bachelor's	Other	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	26-35	$10,000 - $29,999	Yes	Associate's	Student	House	1.	Entertainment	$100 to $199	$200 to $299	$500 and up	Up to $99	$200 to $299	$500 and up
Male	46-55	$120,000+	No	Doctorate	Don't wish to respond	House	0.		$200 to $299	Up to $99	Up to $99	Up to $99	Up to $99	$200 to $299
Male	46-55	$50,000 - $79,000	No	Master's	Education	Condominium	0.		Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99	$500 and up
Male	17-25	Don't wish to respond	No	High School	Don't wish to respond	Apartment	0.		Up to $99	$100 to $199	$200 to $299	Up to $99	$100 to $199	$200 to $299
Female	17-25	$50,000 - $79,000	Yes	High School	Student	Dormitory	1.	Cleaning	Up to $99	$100 to $199	$100 to $199	Up to $99	Up to $99	$100 to $199
Female	17-25	Less than $10,000	Yes	High School	Engineering	Apartment	0.		Up to $99	Up to $99	$200 to $299	Up to $99	Up to $99	$200 to $299
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory	0.		Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	$120,000+	Yes	Bachelor's	Engineering	Apartment	0.		$200 to $299	$500 and up	Up to $99	Up to $99	Up to $99	Up to $99
Female	46-55	Don't wish to respond	No	High School	Engineering	House	0.		$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	46-55	Don't wish to respond	No	Bachelor's	Other	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Don't wish to respond	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	46-55	$80,000 - $119,000	No	Bachelor's	Education	House	1.	Cleaning	Up to $99	$200 to $299	Up to $99	Up to $99	Up to $99	$400 to $499
Male	17-25	$10,000 - $29,999	Yes	Bachelor's	Education	House	0.		$100 to $199	$100 to $199	$100 to $199	Up to $99	$100 to $199	$200 to $299
Female	36-45	$120,000+	No	Master's	Education	House	1.	Cleaning	$100 to $199	$400 to $499	$400 to $499	Up to $99	$300 to $399	$500 and up
Male	17-25	$120,000+	Yes	High School	Student	House	0.		$200 to $299	$500 and up	Up to $99	$100 to $199	Up to $99	$500 and up
Female	36-45	$120,000+	No	Associate's	Other	Condominium	0.		$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99	$400 to $499
Male	17-25	Less than $10,000	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	46-55	$50,000 - $79,000	No	Bachelor's	Other	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	Less than $10,000	Yes	High School	Don't wish to respond	Apartment	3.	don't own any Cleaning, Entertainment	Up to $99	$200 to $299	Up to $99	Up to $99	Up to $99	Up to $99
Female	66+	Don't wish to respond	No	Don't wish to respond	Don't wish to respond	House	0.		$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	56-65	Don't wish to respond	No	High School	Managerial	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	17-25	$30,000 - $49,000	Yes	High School	Engineering	Apartment	0.		Up to $99	$100 to $199	Up to $99	Up to $99	$100 to $199	$200 to $299
Male	36-45	Don't wish to respond	No	Associate's	Engineering	House	1.	Cleaning	Up to $99	$100 to $199	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	36-45	$50,000 - $79,000	No	Master's	Education	House	0.		$200 to $299	$300 to $399	$500 and up	Up to $99	Up to $99	Up to $99
Male	17-25	$50,000 - $79,000	No	Bachelor's	Engineering	House	0.		$200 to $299	$300 to $399	$500 and up	Up to $99	$200 to $299	$500 and up
Female	36-45	$120,000+	No	Master's	Health	House	0.		Up to $99	$400 to $499	$100 to $199	Up to $99	$100 to $199	Up to $99
Male	17-25	Less than $10,000	Yes	High School	Student	Dormitory	0.		$300 to $399	Up to $99	$100 to $199	$500 and up	$300 to $399	$500 and up
Male	17-25	$120,000+	Yes	Associate's	Student	Dormitory	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$400 to $499
Female	17-25	Less than $10,000	Yes	High School	Student	Dormitory	0.		Up to $99	Up to $99	$100 to $199	Up to $99	$100 to $199	$200 to $299
Male	17-25	$80,000 - $119,000	Yes	High School	Student	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Less than $10,000	Yes	High School	Student	Dormitory	0.		Up to $99	$100 to $199	$200 to $299	Up to $99	Up to $99	$400 to $499

Female	56-65	$80,000 - $119,000	No	Master's	Education	House	0.		$300 to $399	$500 and up	$300 to $399	Up to $99	$100 to $199	$500 and up
Male	56-65	Don't wish to respond	No	Doctorate	Legal	House	0.		$100 to $199	$500 and up	Up to $99	Up to $99	Up to $99	$500 and up
Male	46-55	$80,000 - $119,000	No	Master's	Education	Condominium	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	56-65	$120,000+	No	Doctorate	Finance	House	1.	Cleaning	$300 to $399	$200 to $299	$100 to $199	Up to $99	$100 to $199	$500 and up
Female	56-65	Don't wish to respond	No	Master's	Education	House	0.		$200 to $299	$200 to $299	Up to $99	Up to $99	Up to $99	$500 and up
Female	46-55	Don't wish to respond	No	Master's	Education	House	0.		$300 to $399	Up to $99	$300 to $399	Up to $99	$200 to $299	$400 to $499
Male	46-55	$120,000+	No	Doctorate	Legal	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	46-55	Don't wish to respond	No	Master's	Education	House	0.		Up to $99	Up to $99	$300 to $399	Up to $99	$300 to $399	$500 and up
Female	66+	$80,000 - $119,000	No	Master's	Education	House	0.		$100 to $199	$200 to $299	Up to $99	Up to $99	Up to $99	$200 to $299
Female	56-65	Don't wish to respond	No	High School	Health	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	17-25	Don't wish to respond	Yes	High School	Health	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	$300 to $399
Male	56-65	$120,000+	No	Doctorate	Health	House	0.		Up to $99	$200 to $299	$100 to $199	Up to $99	$100 to $199	$200 to $299
Male	46-55	$120,000+	No	Bachelor's	Sales	House	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Female	56-65	$80,000 - $119,000	No	Bachelor's	Public Services	House	0.		$200 to $299	Up to $99	Up to $99	Up to $99	$100 to $199	$100 to $199
Female	56-65	Don't wish to respond	No	Bachelor's	Hospitality	House	0.		$100 to $199	$400 to $499	$300 to $399	Up to $99	$300 to $399	$500 and up
Female	36-45	$50,000 - $79,000	No	High School	Service	House	3.	Cleaning	$400 to $499	$300 to $399	$200 to $299	Up to $99	Up to $99	$500 and up
Female	56-65	$120,000+	No	Doctorate	Legal	House	0.		$200 to $299	$300 to $399	Up to $99	Up to $99	$200 to $299	$400 to $499
Male	36-45	$10,000 - $29,999	No	Bachelor's	Other	House	5.	Cleaning, Entertainment	Up to $99	Up to $99	Up to $99	Up to $99	$200 to $299	$500 and up
Female	56-65	$120,000+	No	Doctorate	Education	House	0.		$200 to $299	$400 to $499	$200 to $299	Up to $99	Up to $99	$400 to $499
Male	17-25	$80,000 - $119,000	Yes	High School	Don't wish to respond	Apartment	0.		Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99

Appendix D – Primary Survey Free Response Results

Laundry, shovel the driveway, cook, clean the bathroom

clean the house and do laundry

Nothing. People should not be allowed to be lazy. And robots are creepy.

-sort laundry by category

-cook pre-determined meals by ingredient

I do not believe robots should be made for such things as tutors/pets/elder care. It is the human interaction of these jobs that makes them work. No older person wants to be taken care of by a robot. And the ability of a robot to adapt to a student struggling or being nervous or even crying during a tutoring session will never compare to that of a human. And a robotic pet just seems stupid/creepy. I don't care for the pet thing that much, but the tutor and elder care robot suggestions I made should be taken seriously.

Work.

Streamline processes that are nuances.

I would like to see robots keep my house organized

I don't need any robots. I can do all of these tasks just fine myself.

However, you may want to look into sex robots. I know that they are an up and coming industry. I know that, in some time in the future, "real" dolls (a type of sex doll) will be robots.

I'm confused to as what qualifies as a robot. Because I don't have any "robots" like things in the movie irobot in my house. Is a computer a robot? This is a weird survey.

Fight off burglars (Like with a giant NET). Oh, and it has voice recognition software in case I need to get in the house through like.. the window or something.

personal assistant/ butler

Laundry & Ironing.

Water Plants.

Collect Legos. and dropped coins.

Home defense and security

Walk a dog

Bartender

Complete Lawn Care

Translator

Do the boring and difficult tasks around the house.

The robot I would most like to see is one to drive your car. Even if it was just highway driving, I find it to be such a boring task and takes time that I could be using to be productive (work, housework, relaxing). Also, traffic jams and high speed crashes would be severely reduced or eliminated with this type of robot. I would also like robots to be able to do menial household chores, such as laundry or dusting .

I don't think I would purchase any of those robots listed above. Quite frankly it would frighten me if there were robots created to perform most of those tasks.

I'm not interested in robots doing anything for me.

Brush my teeth.

I would absolutely love to see a cooking robot in action. That aside, the thing that tops my list on important features is reliability. For one, it's a pain when robots start doing things you don't want to, like overcooking your food or burning the house down. Also, I do not care if the robot is able to move by itself, but rather prefer that

it has to be directly controlled by a human. They aren't "smart" enough yet to figure out how to overcome obsticles such as stairs and pet accidents by themselves, and I would think it would be an easier load (thus cheaper for the consumer) for the programmers to not focus on automation as much as function.

I would like to see household robots doing household chores. Some chores that a robot could do would be laundry or dishes possibly something that has a set routine.

i don't want to see them take over the world

Kill John Connor

Have AI.

Manage common household tasks and keep their owners up to date on the status of the house.

be able to autonomously take out trash, clean floors and other mundane tasks without having to clear the room of obstacles, or set containers in predetermined locations. Currently they inefficiently bump off of table legs and chair legs and go over the same spot repeatedly in order to get to one remote spot.

nothing

sexbots, bending robots, bending sexbots

the personal/elder care sounds good. i work as a medical file clerk and i know that there are a lot of people in our practice that could use the assistance. so that means there are plently of people everywhere that could use the help.

Sexbot. Nuff' said.

routine daily tasks

i think people should not be lazy and do things for themselves

Car washing would be interesting, possibly something that mounts inside your garage. Other than that, a roof snow removal robot would be great for areas that see a large amount of snow.

Make Beds,

Paint Rooms,

laundry,

massage,

"fetching" ie. get the paper, mail, remote, etc.

Do the dishes and the laundry!

laundry, bathroom cleaning, clothes folding, cleaning, clutter organizer, paper sorter (if you mark the paper with a certain code, like a blue X in top right corner, then it knows that it goes into the Bills folder in the organizer), take out trash, wash the car, change car oil, pants/clothes hemming, key/wallet/cellphone finder.

I would like to see them look like household appliances, not real robots. A Roomba is interesting, but the idea strikes me as a bit lazy on the part of the owner. I understand that it improves the quality of life of the owner, and that that is the goal of most robots. I guess I'd like to see household robots do their functions, but not completely eliminate the need for the human to do actual work. That would be ingenious.

nothing

Help do hair and makeup

Not take over the world.

I would like the creators of this form to not have a leading question about how much I would pay for a robot. What if I did not want to pay for a robot of a certain type? There is no place to indicate that

I'm not a huge fan of consumer robots. If it can clean the floor or cut the grass, and do it WELL, I might consider it. I don't think I would even purchase one for any other application. (You may want to add that option to your survey questions.)

Laundry.

mop the floor, fold laundry

clean dust off of hard to reach areas

window washing

Assisting the well beings of people.

Nothing. They seem useless.

I think that the lawn care robot would be extremely useful and is achievable in my lifetime. A cooking robot would require a quantum leap in the area of artificial intelligence, unless you were willing to rearrange your entire kitchen to store the food items in a robotic assembly line system.

Please me

Make life simpler. I wouldn't want robots to take complete functions, but rather support and give help/advice. I believe great household robots are ones that help and supplement other human capabilities with great efficiency.

Play sports

I don't need robots.

Mundane chores, such as vacuuming, dusting, making beds, washing dishes and clothes, mowing the lawn, weeding, etc. I also want a driving robot.

Anything monotonous. Cleaning dishes, washing cloths, sorting cloths, weeding gardens, mowing the lawn, cleaning the pool, etc.

Fill out surveys.

Be able to dust shelves and knick knacks. and paint nails. I wouldn't really care for a lawn care robot or a cooking robot. I don't see the point of a robotic pet. It would be so much more enjoyable to have a real dog/cat/whathaveyou.

Folding laundry and making up the bed.

I would like to see scientific efforts spent on addressing the larger issues facing the world like the climate crisis, energy crisis, and financial crisis. No one will need robots if there is massive poverty and ecological devestation.

Folding laundry, cleaning surfaces, dusting the house

Babysitter essentially. A robot that can cook and care for a child without becoming an emotional and physical dependent of a child.

I would like to see household robots do tedious tasks that are not difficult but time consuming.

Retrieve items from the fridge and pantry.

robotic butlers, duh...

robot to do laundry

robot to do dishes

robot to make food

etc

Laundry/Folding clothes

Rodent and insect control

Keeping out of sight places in order (behind walls)

Control lighting, heating, and electricity for maximum efficiency

Handle organizing storage areas and maybe furniture rearrangement

I love robots!

Traverse stairs!!!

Clean and tidy.

Cook.

I would like to suggest that you include a "none" option in your price selections.

Monitor medication and health to keep complications from occuring.

while lawn care, household cleaning, etc. are useful, I think that the personal/elder care robot (such as ASIMO by Honda) might be the most valuable.

Take surveys for me. JKJK. I would really love if there was a robot that could shovel snow by itself. It's an arduous task and my parents are unable to do it on their own anymore.

Household Robots should have some awareness of others; they should have some ability to sense other robots or humans around them. This feature has lots of possible applications.

Everything

A robot that follows you around the house and play music.

dishes, laundry,cooking, Trash. dull ,boring , repetitive

Not get in the way of peoples daily tasks only assist. (low maintenence, low upkeep)

Simplify or remove day to day tasks.

I'm confused about most of this survey. You know we're all students, why doesn't your survey ask what year we are? (Freshman through Senior or Grad student). And of course we don't have per-year incomes, for most of us "income" is "whatever my parents give me this month." And we certainly don't own homes. Did you want this entire survey to be hypothetical? You also didn't give an "I wouldn't buy one" option in that last section.

To answer the basic idea of your survey, I want to be able to do word processing and emails without a laptop or handheld device. That kind of voice-activated or direct hookup would be a few thousand bucks, I would imagine. Having a robot clean my house would be great, I imagine depending on how in-depth it's functions are, it would range from $50 (just vacuming) to a few thousand (dusting, vacuming scrubbing toilets, etc.) Robotic pets are dumb, it completely defeats the purpose of having a pet. Having robots take care of elderly is insulting. A robotic tutor defeats the purpose of having a tutor. I would rather have a human cook for me, but I'd like to have a robot do the individual processes such as chopping vegetables, cutting the chicken and doing the dishes after. Lastly, I've never had a lawn so I have no idea how strongly I'd feel about taking care of it if I had one.

Cook, Clean, Tutor.

Quickly, efficiently, and thoroughly clean the house.

Eat trash and turn it into gold

organize

Currently, it is very hard to obtain security robots. I purchased a good candidate from Russia and had to reprogram the pistol logic which was kind of a pain, and error-prone(it shot my dog because it thought it was an intruder). I ended up having to dismantle it, because the wife complained and I never got the logic right.

Therefore, I would like an off-the-shelf security/assault robot that is armed with a semi-automatic 40 caliber pistol. For an secondary weapon I would want it to have tear gas. I would also like a "take-over" mode where I can take control of my assault robot from my desk chair. The robot should have infer-red, ultra-violet, and regular vision sensors that I can view over an encrypted channel. The aiming mechanism for the weapons should display on the screen similar to a HUD. The robot should have an emergency turn off over the encrypted channel such that it does not turn on its owner after gaining a mind of its own.

I think an assault robot should be the next logical step for home, business, and property defense.

Nothing. I honestly don't believe that we need robots or will ever need them. I am perfectly content with holding a vacuum and using it for myself. I don't need Roomba to roam around cleaning for me. I think Americans are already too lazy and don't need incentive to do even less work. Robots are unnecessary and the only reason I would like to see one is because it's "cool." For example, I recently went to the science center and they had a robot exhibit. I played air hockey against a robot. It was "cool" but I don't know why anyone wasted their time, energy, or money in designing it.

In all honesty I cannot see robotics becoming a large part of one's life in the manner that the questions of this survey suggest, nor would I personally wish to see them do so.

N/A, not interested in household robots.

I'd like to see household robots be able to do laundry.

Mow the lawn! Take out the trash! Do the dishes! All of the mundane household chores.

I don't think they'll ever do anything besides mow the lawn or vaccuum/mop the floor. I also wouldn't trust any product that said it did anything more advanced than these tasks.

Laundry.

A robot that could help with the elderly would be great. I could picture the robot being used to help with simple tasks, giving medications on time, etc.

Control heating around the house, detect carbon monoxide

I would like a robot to help bring groceries in from the car. I would also like a robot to help move furniture/lift heavy items. If it could also play music while helping you out, that would be great.

haven't given this much thought ever. Maybe something to help in the yard or with gardening

Assist with cooking, maintenance of mechanical vehicles (cars, boats, etc), maintenance of lawn care, build an Iron Man suit.

Programmed to feel real human emotions for the purpose of interacting with their human owners.

Let my dog out

Laundry.

(Can't think of anything- I don't even have a dishwasher at home.)

switch laundry from the washer to the dryer

patrol the streets of woosta...too many incidents that could potentially be capture by video recording robots station in specific areas. (security)

Tech Pizza should have a robot waiter

A robot that does your laundry would be nice.

(please use a real marketing research book as reference before making a new survey, not professional at all)...good luck either way.

Certainly provide assistance to those who need it (elderly, disabled) would be a great area for better expansion and development

General purpose helper - i.e. a maid

nothing really. i like the idea of a cleaning robot but i robots kind of freak me out.....the whole ability to make they're own decision....you know, have you ever seen terminator??

This survey has a serious design problem. There are types of robots I would not pay for, but this is not an option.

I would like a robot to be able to do chores around the house (cooking, cleaning, laundry.)

Test bacteria levels on various parts of the house, it is nice to be clean but there are certain areas that are critical like the kitchen counters, bathroom sink, etc.

mow my lawn. that would be awesome!

Paint

vacuum, laundry (folding and put away), iron clothes

I guess when I think of robots I'm thinking more along the lines of medicinal purposes. Like robots who can perform surgeries, etc.

Maybe a robot that could diagnose illnesses, medical maladies, etc. so that one could avoid having to go to the doctors office and sit around and wait all day.

Wash floors.

Dust (I hate to dust).

Rake leaves and dispose of them at the same time.

A family organizer would be great. It could work like a GPS - telling you what is on the schedule for the day while you are making breakfast. :) Reminding the kids about their homework, projects, notes for teachers, etc. (so I don't have to remember it ALL). That would be awesome! - but it would have to be affordable too. If it could have homework help built in as well as keep track of recipes (that it could dictate to you while you cook) that also would be cool. Oh - and a chore chart for the kids - with reminders about what jobs need to be done (and words of encouragement for completed jobs - also would be very cool!) While we are at - add in reminders for the kids that can be programmed ("Brush teeth", "Put on Shoes", "Don't forget your Hat and Mittens", "Do you have your lunch?" "Did you hang up your coat?" "Get Ready for soccer: cleats, socks, water bottle") - these could even be recorded in mom or dad's voice for playback. Again, having a related checklist the kids could use (would need a touch screen), to update when they had completed each item. WIth reports mom and dad could check on - and use to track allowance.

WOW would that be great!!! =^D

Wash windows

I haven't even thought about the possibilities. Definitely cleaning.

NOT be pets for one. I don't see the appeal of a robotic pets, it doesn't make sense to me. I think that, in this point in humanity's development, the last thing we need is a household robot. We're lazy enough as it is, I think we need to examine closely the creation of robots and AI, not that I'm worried about a Matrix like event happening, but I think that because we can, doesn't mean we should.

I think that right now, military and industrial robots makes sense, and that devices like the roomba are cool toys, but right now we're not ready for Rosie from the Jetsons.

vacumn, mow lawn

do the dishes wash the laundry, fold it everything that's a chore..

Cook and clean!

Anything to reduce cleaning would be wonderful.

cook, clean, read, garden weeds!assist handicapp

I would like to see them operate in the background, at my direction in any manner I wish. THe ideal robot would clean my floor, take out my garbage, tell me how many casualties there were on the Confederate side at Gettysburg as well as book my movie tickets and schedule my car maintenance.

clean bathrooms - including cleaning shower/tub and toilets

1) Follow me when I walk the real dog and scoop the poop.

2) Empty all the trash cans in the house.

3) Take out the recycling.

4) Take the trash out to the street on trash day.

5) Crush up corrugated cardboard and tie it up for recycling.

6) Retrieve beverages from rerigerator and serve them to me and my guests.

7) Act as security patrol in my home and notify me when certain conditions exist such as intruders, fire, temperature extremes, power outages.

8) Cook meals.

No need for a robot

I would like household robots to do the following: scrub the shower; clean the toilet; clean the litterbox; dust furniture; fold laundry; make the bed - basically everything!

mow my lawn

clean windows, paperwork, wash walls, clean car, water plants, cat litter box, empty garbage cans, empty dishwasher, dust

* Automated laundry, including dry cleaning and pressing.

* Pet care (grooming, feeding, watering, playing with etc.)

* Answer questions for which I'd have to look online, or listen to the TV/radio on a regular basis, like what is the weather outside, what are the news headlines, what is my schedule for today etc.

Play with pet...throw toys, pat, run with...keep entertained. Basically, I need another dog but am not willing to feed or care for it...so we are sticking with one.

I find other household chores actually relaxing.

Security

Drive me to work.

My response to each of the previous questions is NOT "up to $99" but rather "I do not wish to own one." By not including a response option such as that, you are guaranteeing biased results that will overstate interest in consumer robotics.

For the average well-body person, robots are a luxery that is really not needed. However, for handicapped or the elderly, robots could allow them to live independently for longer. I would love to say that for the rest of us, the repetetive chores that robots could take over for us would be helpful in giving us time for more important things like spending time with loved ones, but social history teachers what we will probably do is fill that time with tv and games.

Clean the bathroom.

fold and put wash away But that is impossible

I have a Robobot vacuum that was a Christmas gift and has been sitting unused for three years. The kids played with it a few times and lost interest. My husband does a great job cleaning our tile and wood floors with a broom and a mop. Often when using the self-checkout at stores human intervention is needed for the transaction. Human beings are complex and robots are often inadequate for our needs. If you consider a bread machine a robot, then yes, I simply can not live without this device. I have lost all interest in kneading bread flour.

I'm ambivalent and not completely comfortable with the entire concept of robotics.

clean a shower/tub/tile floor

Laundry

Clearing snow from driveways and walks

Painting

This is a comment about the question on purchase price. I would not buy at any price a vacuuming robot, a lawn care robot, a robotic pet, an educational/tutor robot or an elder care robot. I would love a cooking robot, but it would have to be a GOOD cooking robot.

Household maintenance such as scraping and painting the exterior, drain cleaning, chimney cleaning, or car maintenance such as changing oil. I don't need personal care or elder care, but I could see a lot of use in having robots for lifting, carrying, reaching, etc. Leaf raking and bagging, brush clearing and stump grinding and digging would be useful. Basically, the work that requires more muscle or involves dangerous heights, etc.

Play with my dogs.

I'd need a definition of robot. I watched my daughter-in-law's robot vaccuum cleaner and doubt it does the whole surface area equally. Robot pets are entertaining for about an hour. If you can consider an ATM a robotic replacement for a bank teller, then, even though it functions effectively, the replaced person still needs employment.

A bigger issue is what does it allow the human to do with the time that is freed from the given chore? Part of what gives a human a sense of purpose is, in fact, work, learning, accomplishing tasks. I worked in a nursing home and I can tell you that being of no use is hard on the old people.

I like the idea of robots fighting wars for people instead of people. You could still ponder if war would be elected as a choice even more frequently and with even less regard for human well being than it is now.

help with the care of the elderly without costing a job of a working individual Iam sure there are other aspects needed for instance when the need of someone having to be home alone families can't afford long term help.

Walk the dog.

Guard the apartment against theft, park the car, clean during the night, monitor energy usage and adjust.

Clean toilets, wash walls and windows.

Laundry! From collecting it, placing it in the washer & dryer as well as folding afterward.

You didn't have "$0" on the price willing to pay for certain robots above. I don't want a robotic pet, tutor or cook.

I could use a robot for: any sort of house cleaning, complete laundering with line-drying & folding, carrying things up & down the stairs.

iron

assist but not do

Meal planning and execution. Cleaning/laundry. Bill paying.

I am not ready to accept robots as part of my lifestyle at this time.

find the tv remote control

wash windows - inside and out

replace items into their proper storage space

wash floors

clean bathrooms

wash cars

dust furniture

walk dog

pick up dog waste

plant flowers

shovel snow

wash exterior of house

take out garbage- from home and also to curb

wake up children

clean oven and stove

convince wife to have sex with husband

clean the cat litter box

Personal/elder care is a fantastic area for robots. The elderly will hate the robots initially, but the person who purchases will be their children. That is the group that will know what is needed and that will be marketed to. My elderly mother is currently paying $3,000 per week for personal care that assures her safety. I'd pay a lot for a robot that would keep her safe.

raking

clean my car

everything i dont want to do, or dont have time for.

Be a helper and companion in old age, also help with house security.

I would not be willing to pay for any robot, outside possibly cleaning. Thus, your questionnaire should have had a reply option of not being willing to pay anything.

Housework

Try reading "I sing the body electric" -- a short story by Ray Bradbury. That's what I would like. 8-)

Nothing. Manual activities allow better for unique situations and give better control over each operation. Efficiency gains don't justify the lack of personal activity benefits (exercise, etc.).

wash windows

detail the car

I have absolutely NO interest in ANY of the types of robots you mention. A ROBOTIC PET? You've got to be joking!!! Only if I could feed it to my Siberian Husky!

Clean toilets

CLEAN BATHTUBS AND TOILETS SINKS AND FLOORS DO DISHES AND ALL HOUSEHOLD CHORES AND ALSO BAKE BREAD.

clean, help me organize my chores by gently reminding me of scheduled tasks, properly dispense appropriate medications, mow the lawn,rake

Scrape and paint the house.

Windows!

Housework, the heavy stuff, move furniture and clean under and behind, lift heavy things, srub floors, baseboards, vacuum, climb ladders and do high cleaning, clean bathrooms, floors, sinks, flushes, dust.

Do household repairs, hang pictures, setup and maintain my computer and wireless system, setup appliances, TVs, phone systems, etc. troubleshhot tech. things when they don't work.

Clean the gutters, mow the lawn, clean the garage, cellar, rake leaves, do heavy yardwork, wash windows inside and out

At this stage of my life, I do not see myself making use of any household robots.. I enjoy doing things myself. I do, however, think that the lawn & outside chores might be done by a robot when Jim is much, much older & we can't convince the grandkids to do them !!

Chop wood and pile it up.

Really clean house.

The things I hate to do (e.g., cleaning toilets, showers, bathtubs, sinks)or find it difficult to do (e.g., cleaning behind and underneath furniture that is too heavy to move, shoveling snow)

Clean house - vacuum, wash walls, windows, and floors, shovel sidewalks and driveway.

Have no idea.

Clean the toilets

Appendix E – Secondary Survey Results

What is your gender?	Select appropriate age group.	How many robots does your household own?	Vacuuming/Floor Cleaning Robot	Lawn Care	Cooking Robot	Robotic Pet	Educational/Tutor Robot	Personal/Elder Care Robot
Male	56-65	1	Up to $99	$100 to $199	$300 to $399	$300 to $399	$500 and up	$400 to $499
Male	13-16	0	$200 to $299	$200 to $299	Not Interested	Not Interested	$200 to $299	$300 to $399
Male	17-25	1	$100 to $199	$400 to $499	$300 to $399	Up to $99	$100 to $199	$500 and up
Female	13-16	0	Up to $99	$200 to $299	$200 to $299	$200 to $299	$100 to $199	$300 to $399
Male	17-25	0	$200 to $299	$400 to $499	$300 to $399	$500 and up	$500 and up	$500 and up
Female	13-16	0	$200 to $299	$100 to $199	$100 to $199	$100 to $199	$100 to $199	$100 to $199
Male	56-65	0	$200 to $299	$200 to $299	Up to $99	Up to $99	$200 to $299	$400 to $499
Male	46-55	0	$200 to $299	$400 to $499	Not Interested	Up to $99	$400 to $499	$500 and up
Male	17-25	0	Up to $99	$100 to $199	$200 to $299	Up to $99	$100 to $199	$300 to $399
Male	13-16	0	Up to $99	$100 to $199	Up to $99	$100 to $199	Up to $99	$100 to $199
Male	17-25	0	Up to $99	$200 to $299	$200 to $299	Up to $99	$300 to $399	$400 to $499
Male	17-25	0	$100 to $199	Up to $99	$500 and up	Up to $99	Up to $99	Up to $99
Male	17-25	0	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99	Up to $99
Male	13-16	0	$100 to $199	$200 to $299	Up to $99	Up to $99	$200 to $299	$100 to $199
Male	13-16	0	$100 to $199	$200 to $299	Up to $99	Up to $99	$200 to $299	$200 to $299
Male	17-25	0	$100 to $199	Up to $99	$200 to $299	Up to $99	$200 to $299	$100 to $199
Male	17-25	0	$100 to $199	$100 to $199	$100 to $199	Up to $99	$100 to $199	$200 to $299
Female	17-25	0	$400 to $499	$500 and up	$100 to $199	Up to $99	Up to $99	$500 and up

Male	13-16	2	$100 to $199	$100 to $199	$500 and up	$100 to $199	$400 to $499	$200 to $299

Appendix F – Primary Survey

Public Opinion and Use of Consumer Robotics

This survey is being conducted by students of Worcester Polytechnic Institute and contains a few questions about your household and your opinion on consumer robotics. When the results are aggregated, this survey may indicate the desires of the average United States household for the future of consumer robotics. Thank you for your time.

Background Information (optional)

What is your gender?
- Male
- Female

Select appropriate age group
- Don't wish to respond
- 17-25
- 26-35
- 36-45
- 46-55
- 56-65
- 66+

What is your average yearly household income (in USD)?
- Don't wish to respond
- Less than 10,000
- 10,000 - 29,999
- 30,000 - 49,999
- 50,000 - 79,999
- 80,000 - 119,999
- More than 120,000

Are you currently attending school?
- Yes
- No

What is your highest completed level of education?
- Don't wish to respond
- No Formal Education
- Middle School
- High School
- Bachelor's
- Master's
- Doctorate

What is your occupational area?
- Don't wish to respond
- Animal Care
- Armed Forces
- Biotechnology
- Database
- Education
- Engineering
- Entertainment
- Finance
- Government
- Graphics
- Health
- Hospitality

Legal
Managerial
Networking
Programming
Public Services
Sales
Secretarial
Service
Student

In what type of residence do you currently reside?
Apartment
Condominium
Dormitory
House

Questions on Consumer Robots (required)

How many robots does your household own?
0
1
2
3
4
5
6
7
8
9
10+

What are the primary functions of the robots your household owns (if any)? [Check all that apply]
Cleaning
Entertainment
Lawn Care
Security
Other [ ] (fill in)

How much would you be willing to pay for the following types of robots?

Vacuuming/Floor Cleaning Robot
Up to $99
$100 to $199
$200 to $299
$300 to $399
$400 to $499
$500 and up

Lawn Care
Up to $99
$100 to $199
$200 to $299
$300 to $399
$400 to $499
$500 and up

Cooking Robot
Up to $99
$100 to $199
$200 to $299
$300 to $399
$400 to $499

$500 and up
Robotic Pet
Up to $99
$100 to $199
$200 to $299
$300 to $399
$400 to $499
$500 and up
Educational/Tutor Robot
Up to $99
$100 to $199
$200 to $299
$300 to $399
$400 to $499
$500 and up
Personal/Elder Care Robot
Up to $99
$100 to $199
$200 to $299
$300 to $399
$400 to $499
$500 and up

Optional Questions

What would you like to see household robots be able to do?
[ ] (fill in)

Appendix G – Secondary Survey

Public Opinion and Use of Consumer Robotics

This survey is being conducted by students of Worcester Polytechnic Institute and contains a few questions about your household and your opinion on consumer robotics. When the results are aggregated, this survey may indicate the desires of the average United States household for the future of consumer robotics. Thank you for your time.

Background Information (optional)

What is your gender?
- Male
- Female

Select appropriate age group
- Don't wish to respond
- 13-16
- 17-25
- 26-35
- 36-45
- 46-55
- 56-65
- 66+

Questions on Consumer Robots (required)

How many robots does your household own?
- 0
- 1
- 2
- 3
- 4+

How much would you be willing to pay for the following types of robots?

- Vacuuming/Floor Cleaning Robot
  - Up to $99
  - $100 to $199
  - $200 to $299
  - $300 to $399
  - $400 to $499
  - $500 and up
  - Not Interested
- Lawn Care
  - Up to $99
  - $100 to $199
  - $200 to $299
  - $300 to $399
  - $400 to $499
  - $500 and up
  - Not Interested
- Cooking Robot
  - Up to $99
  - $100 to $199
  - $200 to $299
  - $300 to $399
  - $400 to $499

- $500 and up
- Not Interested

Robotic Pet
- Up to $99
- $100 to $199
- $200 to $299
- $300 to $399
- $400 to $499
- $500 and up
- Not Interested

Educational/Tutor Robot
- Up to $99
- $100 to $199
- $200 to $299
- $300 to $399
- $400 to $499
- $500 and up
- Not Interested

Personal/Elder Care Robot
- Up to $99
- $100 to $199
- $200 to $299
- $300 to $399
- $400 to $499
- $500 and up
- Not Interested

Appendix H – Web Links to Several Consumer Robotics Companies

www.irobot.com

www.automower.us

www.evolution.com

www.willowgarage.com

www.roboticazucchetti.it

trilobite.electrolux.com

www.karcherresidential.com/en/showproducts.php?op=view_prod&param1=143&param2=&param3=

anybot.com

http://www.pleoworld.com/Home.aspx

http://support.sony-europe.com/aibo/